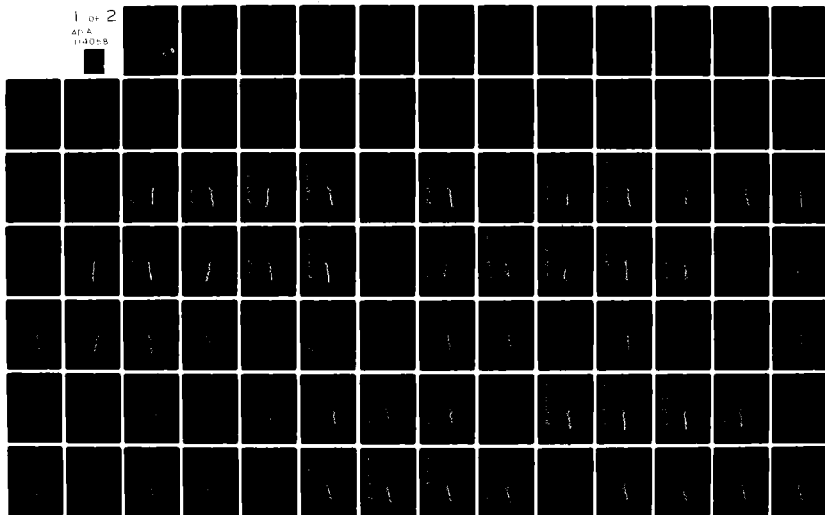


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UNITED STATES AIR FORCE  
HILL AIR FORCE BASE, UTAH 84056

PROPELLANT  
SURVEILLANCE REPORT  
LGM-30 F&G STAGE 1  
PHASE G, SERIES I  
TP-H1011

PROPELLANT ANALYSIS LABORATORY

MANPA REPORT

MANPA 465(82)

February 1982

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PROPELLANT SURVEILLANCE REPORT  
LGM-30F & G STAGE I (TP-H1011)

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February 1982

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DISTRIBUTION STATEMENT A

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# ABSTRACT

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30F and G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk carton propellant data. Testing was accomplished in accordance with MMWRBA Project MO4046C.

The data from this test period are combined with data from previous testing and entered into the G085 Computer for storage, analysis, and regression analysis. From the statistical analysis of all data tested to date (fifteen and one-half years for F & G), significant degradation of the propellant does not appear likely for at least two years past the oldest data point.

Each point on the regression plot represents the mean of all samples at that particular age. The number of samples at each point is indicated on the sample size summary sheet on the page accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the G085 System.



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29B	Zero Time Test Results	29 Jan 64
29C	Zero Time Test Results (Supplement 1)	30 Mar 64
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29F	ATP Phase I Test Results	30 Mar 65
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118	ATP Phase II, wings II-V (First Group)	5 Mar 68

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290	Propellant Surveillance Report LGM-30 F & G, Stage I, Phase B, Series I TP-H1011	Mar 74
300	Minuteman Stage I Motor Reliability Improvement Program Surveillance	May 74

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302	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Nov 74
313	Stage 1 Propellant Surveillance Report, Propellant Containing Glacial Acrylic Acid	Oct 74
315	Propellant Surveillance Report LGM-30 F & G Stage 1, TP-H1011	Jan 75
316	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Feb 75
319	Propellant Surveillance Report LGM-30 Dissected Motors, Phase VI, TP-H1011	Apr 75
321	Propellant Surveillance Report LGM-30 F & G Stage 1, Phase B, Series II, TP-H1011	Apr 75
325	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Jun 75
328	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Sep 75
330	Propellant Surveillance Report LGM-30 F & G Stage 1, TP-H1011	Oct 75
335	Stage 1 Motor Reliability Improvement Program	Dec 75
337	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1043	Feb 76
339	Stage 1, New MAPO & ERL-510 Qualification	Mar 76
341	Propellant Surveillance Report LGM-30 Dissected Motors, Phase VII, TP-H1011	Mar 76

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343	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1011	Jun 76
345	Propellant Surveillance Report LGM-30 F & G, Stage 1 Phase B, Series III, TP-H1011	Jun 76
350	Qualification of a New MAPO Source and ERL-510 Curing Agent for Minuteman, Stage 1, UF-2121 Liner	Sep 76
351	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1011	Sep 76
354	Minuteman Stage 1 Motor Reliability Improvement Program Surveillance	Sep 76
358	Propellant Surveillance Report LGM-30 Dissected Motors, Phase VIII, TP-H1011	Oct 76
360	Propellant Surveillance Report LGM-30 F & G, Stage 1 Phase E, Series III, TP-H1011	Nov 76
367	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1011	Apr 77
370	Propellant Surveillance Report LGM-30 F & G, Stage 1, Phase E, Series II, TP-H1011	Apr 77
377	Qualification of a New MAPO Source and ERL-510 Curing Agent for Minuteman Stage 1, UF-2121 Liner	Oct 77
379	Final RIP Report, Minuteman Stage 1 Motor Reliability Improvement Program Surveillance	Oct 77
385	Propellant Surveillance Report LGM-30 A, B, F, & G, Stage 1, TP-H1043	Dec 77
388	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Jan 78
390	Propellant Surveillance Report LGM-30 F & G Stage 1, Phase E, Series IV, TP-H1011	Feb 78
392	Propellant Surveillance Report LGM-30 Dissected Motors, Phase IX, TP-H1011	Mar 78
393	Propellant Surveillance Report LGM-30 A & B Stage I, TP-H1011	May 78

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396	Propellant Surveillance Report LGM-30 F & G Stage I, TP-H1011	Jun 78
405	Propellant Surveillance Report LGM-30 F & G Stage I, TP-H1011	Oct 78
406	Propellant Surveillance Report LGM-30 Dissected Motors, Phase X, TP-H1011	Nov 78
416	Propellant Surveillance Report LGM-30 F and G Stage I, TP-H1011	Apr 79
423	Propellant Surveillance Report LGM-30 F and G Stage I, TP-H1011	Oct 79
424	Propellant Surveillance Report LGM-30 Stage I, TP-H1043	Nov 79
425	Propellant Surveillance Report LGM-30 A and B Stage I, TP-H1011	Nov 79
427	Propellant Surveillance Report LGM-30 Dissected Motors, Phase XI, TP-H1011	Nov 79
438	Propellant Surveillance Report LGM-30 F and G Stage I, TP-H1011	Apr 80
445	Propellant Surveillance Report LGM-30 F and G Stage I, TP-H1011	Sep 80
448	Propellant Surveillance Report LGM-30 A and B Stage I, TP-H1011	Nov 80
452	Propellant Surveillance Report LGM-30 Dissected Motors, Phase XI, TP-H1011	Jan 81
458	Propellant Surveillance Report LGM-30 F and G Stage I, TP-H1011	May 81
462	Propellant Surveillance Report LGM-30 Stage I, TP-H1043	Oct 81

## GLOSSARY OF TERMS AND ABBREVIATIONS

Aging Trend	A change in properties or performance resulting from aging of material or component
CSA	Cross Sectional Area
DB	Dogbone
Degradation	Gradual deterioration of properties or performance
E	Modulus (psi), defined as stress divided by strain along the initial linear portion of the curve.
EB	End Bonded
EGL	Effective Gage Length
em	Strain at maximum stress
er	Strain at rupture
"F" ratio	The ratio of the variance accounted for by the regression function to the random unexplained variance. The regression function having the most significant "F" ratio is used for plotting data. The ratio is also used in detecting significant changes in random variation between succeeding time points
JANNAF	Joint Army, Navy, NASA, Air Force Committee
MANCP	Propellant Lab Section at Ogden Air Logistics Center
Ogden ALC	Ogden Air Logistics Center, Air Force Logistics Command
r or R	The Correlation Coefficient is a measure of the degree of closeness of the linear relationship between two variables
Linear Regression Equation	The general form of the linear regression equation is $Y = a + bx$
Regression Line	Line representing mean test values with respect to time
$S_b$	Standard error of estimate of the regression coefficient

## GLOSSARY OF TERMS AND ABBREVIATIONS (cont)

$S_e$ or $S_{y.x}$	Standard deviation of the data about the regression line
$S_m$	Maximum Stress
$S_r$	Stress at rupture
Standard Deviation ( $S_y$ )	Square root of variance
Strain Rate	Crosshead speed divided by the EGL
"t" test	A statistical test used to detect significant differences between a measured parameter and an expected value of the parameter (determines if regression slope differs from zero at the 95% confidence level)
Variance	The sum of squares of deviations of the test results from the mean of the series after division by one less than the total number of test results
3 Sigma Band	The area between the upper and lower 3 sigma limit. It can be expected that 99.73% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed.
90-90 Band	It can be stated with 90% confidence that 90% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed
Significant	As used in the statistical sense, means a difference unlikely to have been the result of random sampling from some specified population.



## INTRODUCTION

### A. PURPOSE:

Laboratory testing has been performed for fifteen and one-half years on First Stage LGM-30F and G Minuteman Motor propellant blocks to evaluate the effects of aging on TP-H1011 propellant. This report contains those tests conducted on propellant as instructed in MMWRBA Test Directive GTD-1C, Amendment 2, LGM-30 First Stage Operational Propellant Laboratory testing.

Statistical analysis of the data from tests performed will provide early warning if serious degradation trends develop. Annual evaluation of the propellant provides data for input into engineering reliability analysis for service life predictions.

### B. BACKGROUND:

LGM-30F and G testing was started in 1966 with phase testing at 24 month intervals (Report Numbers 78 - zero time; 104, 162, 185 - Phase I; 176, 239, 257 - Phase II; 271 - Phase III). Report number 257 was the first time that LGM-30F and G data were statistically analyzed separately from LGM-30A and B data. The present report is a continuation of testing and statistical analysis.

Zero time testing for LGM-30 A, B, F, and G was started as soon as possible after receipt of the propellant by MANPA. Data from these tests were used to establish a base line for each test parameter.

The LGM-30F and G propellant test matrix (Table 1) is used to determine the number of specimens to be taken from each propellant loaf and the specific test or tests to which these specimens are to be subjected. Very low rate and low rate tensile specimens are taken on all LGM-30F and G blocks. Specimens for other physical and combustion tests are taken from every third (LGM-30F and G) block.

TABLE 1

## SAMPLE PLAN

The Procedure for determining tests to be performed on propellant batch samples of LGM-30 F & G First Stage Motors are as follows:

1. Divide the USAF motor serial numbers into three groups by dividing the last three digits of each serial number by three to determine the remainder integer, e.g.,  $154 \div 3 = 51$  with a remainder integer of 1.
2. Use the remainder integer to enter the following matrix to determine the group of tests to be performed on the forward, middle, and aft batch samples associated with a particular motor serial number.

GROUP MATRIX			
TP-H1011 PROPELLANT BATCH SAMPLE	GROUP I	GROUP II	GROUP III
Forward	1	2	0
Middle	0	1	2
Aft	2	0	1

Each group will receive the following tests:

TEST MATRIX			
GROUP I	GROUP II	GROUP III	
High Rate Triaxial	Dynamic Response	High Rate Hydrostatic	
Creep	Stress Relaxation	Sol Gel	
Biaxial Low Rate	Burning Rate	DSC	
TCLE	Heat of Explosion	TGA	
Hardness	Pressure Time	DTA	
Ignitability		Impact	

NOTE: Low Rate and Very Low Rate Tensile tests are performed on all blocks.

## STATISTICAL APPROACH

In order to determine aging trends for shelf/service life predictions, as directed by Service Engineering, First Stage LGM-30 F and G Minuteman TP-H1011 propellant blocks have been undergoing testing since 1966, statistically analyzed and reported on a regular test cycle by this laboratory.

The primary reason for performing statistical analysis on test data is for the detection of propellant changes due to aging that would affect motor reliability. Regression analysis was the method used to examine data and to aid in drawing conclusions about dependency relationships that may exist i.e., relationship between age versus test results.

In selecting the best fit model for the regression equation, the linear model  $Y = a + bX$  was found to be the best fit model for the regression plots.

Individual data points from different time periods were used to establish a least squares trend line for the data. The variance about the regression line, obtained using individual values of the dependent variable, was used to compute a tolerance interval such that at the 90% confidence level 90% of the sample distribution falls within this interval. This tolerance interval was extrapolated to a maximum of 24 months into the future from age of the oldest motor tested. The 't' value and the significance of this statistic, which are reported for each regression model, give an indication of the "statistical significance" of the slope of the trend line as compared to a line of zero slope. When a regression slope is indicated to be significant, it should be noted that the slope of the regression line is significant from a statistical standpoint and it is an indication that a change over time is occurring, but does not necessarily mean that the indicated change in the

value obtained during testing is significant in regards to motor operational performance. In a few cases, this small change has become the apparent trend in data variance and regression line trends. However, the changes are gradual and no operational problems are expected at this time.

The data were plotted by computer. The 'y' axis is computed so that the values at one inch intervals are peculiar to the data spread of the parameter tested. Plotted data points represent means at the particular ages at which testing occurred. The number of specimens at each age point is indicated on the sample size summary sheet accompanying the regression plot. Variance at each test age can be determined by consulting the G085 data storage system.

A regression summary of all test parameters is included in Table 2. The direction of the regression trend lines are also indicated in Table 2. The slopes that are "statistically" not significant from a line of zero slope are labeled as such.

## TEST RESULTS

### VERY LOW RATE TENSILE:

Very low rate regressions show a statistically significant decrease for strain at maximum stress and strain at rupture. The stresses and modulus show a statistically significant increase (Figures 1 thru 5). The trends are gradual for the respective regressions and no operational problems from the propellant are expected for at least two years beyond the last test date.

### LOW RATE BIAXIAL TENSILE:

The strain at maximum stress regression shows a statistically significant gradual increase with the strain at rupture showing no statistically significant change. The stresses and modulus show a statistically significant increase (Figures 6 thru 10).

### LOW RATE TENSILE:

Low rate tensile data regressions show a statistically significant gradual decrease for strains and a statistically significant increase for stresses and modulus (Figures 11 thru 15).

### HIGH RATE TRIAXIAL TENSILE:

The strain at maximum stress, strain at rupture and modulus regressions show a statistically significant decrease. Maximum stress shows a statistically significant increase. Stress at rupture does not show a significant change (Figures 16 thru 20).

### HIGH RATE HYDROSTATIC TENSILE:

The strains show a statistically significant decrease. The stresses and modulus show a statistically significant increase (Figures 21 thru 25).

#### TEAR ENERGY:

The cohesive energy shows a statistically significant decrease (Figure 26).

#### TENSILE SUMMARY:

The test data regressions show that the strain is gradually decreasing and the stress and modulus gradually increasing.

Based on the analysis of test data regressions, it does not appear that meaningful degradation is occurring at this time and no operational problems are expected in the propellant for at least two years beyond the last data point.

#### STRESS RELAXATION MODULUS:

For the 0.5% strain at  $-65^{\circ}\text{F}$ , the regressions for data at 10, 50, 100, and 1000 seconds show a statistically significant increase (Figures 27 thru 30).

At  $-40^{\circ}\text{F}$ , the 10, 50, and 100 second regressions show a statistically significant increase. The 1000 second regression shows no change (Figures 31 thru 34)

The 3% strain regressions at  $20^{\circ}\text{F}$ ,  $77^{\circ}\text{F}$ ,  $100^{\circ}\text{F}$ ,  $140^{\circ}\text{F}$ , and  $180^{\circ}\text{F}$  all show a statistically significant increase (Figures 35 thru 54).

#### SO GEL:

The % extractables and density are not significant. The gel swell ratio and crosslink density regressions show a statistically significant increase (Figures 55 thru 58).

#### CONSTANT STRAIN:

A statistically significant decreasing trend is shown for the constant strain (Figure 59).

#### HARDNESS:

Shore A ten second hardness shows a statistically significant increasing trend (Figure 60).

#### SUMMARY OF SOL GEL, TENSILE, AND HARDNESS DATA:

The crosslink density, constant strain, and hardness data regressions correlate well with the tensile data. As the polymer continues to crosslink, the strains decrease and stresses increase.

#### PRESSURE TIME:

Maximum pressure and time to maximum pressure shows a statistically significant gradual decreasing trend (Figures 61 and 62).

#### TCLE (Thermal Coefficient of Linear Expansion):

The TCLE for both above and below the glass transition point ( $T_g$ ) shows a statistically significant increasing trend (Figures 63 and 64).

#### TGA (Thermal Gravimetric Analysis):

A statistically significant increase is shown for the ignition temperature ( $9^\circ\text{C}$  rise/min), and weight loss at ignition. No significant trend was observed for weight loss at  $250^\circ\text{C}$  hold ( $12^\circ\text{C}$  rise/min to hold) (Figures 65 thru 67).

#### DTA (Differential Thermal Analysis):

The endotherm and first and second exotherms show a statistically significant decreasing trend. The third exotherm shows a statistically significant increasing trend and the ignition temperature shows no significant change (Figures 68 thru 72).

**BURNING RATE:**

The burning rate shows a statistically significant gradual increase (Figure 73).

**THERMAL AND COMBUSTION SUMMARY:**

The time to maximum pressure from the pressure time data and burning rate data show a correlation. In both cases, the regressions show a gradual increase in rate of reaction.

The ignition temperatures for TGA shows a gradual increase.

From the analyses of the regressions, no combustion problems are expected for at least two years beyond the oldest data point.



## CONCLUSIONS

Fifteen and one-half years of aging at ambient temperature (77°F) has not greatly changed the properties of the propellant. Some test parameters indicate slight aging trends, but nothing that would adversely affect the operational characteristics of the rocket motor propellant.

From the statistical analysis, it does not appear that significant propellant degradation is occurring. Based on fifteen and one-half years of accumulated data, there is no reason to suspect that properties will show much change for at least two years past the last data point. Therefore, propellant reliability should not change appreciably over that time period. Since failure limits are not available for the parameters tested, this statement is based on the fact that the slope of the regression curves where statistically significant are, with few exceptions, relatively flat or close to a line of zero slope and have not changed appreciably from the last test period.

TABLE 2

## Regression Summary

<u>Test Parameter</u>	<u>Slope</u>
Very Low Rate Tensile	
Strain at Maximum Stress	-
Maximum Stress	+
Strain at Rupture	-
Stress at Rupture	+
Modulus	+
Low Rate Biaxial Tensile	
Strain at Maximum Stress	+
Maximum Stress	+
Strain at Rupture	NS
Stress at Rupture	+
Modulus	+
Low Rate Tensile	
Strain at Maximum Stress	-
Maximum Stress	+
Strain at Rupture	-
Stress at Rupture	+
Modulus	+
High Rate Triaxial Tensile	
Strain at Maximum Stress	-
Maximum Stress	+
Strain at Rupture	-
Stress at Rupture	NS
Modulus	-
High Rate Hydrostatic Tensile	
Strain at Maximum Stress	-
Maximum Stress	+
Strain at Rupture	-
Stress at Rupture	+
Modulus	+
Tear Energy	-
Stress Relaxation	
-65°, 10 sec	+
-65°, 50 sec	+
-65°, 100 sec	+
-65°, 1000 sec	+
-40°, 10 sec	+
-40°, 50 sec	+
-40°, 100 sec	+
-40°, 1000 sec	NS

TABLE 2 (cont)

Regression Summary		Slope
Test Parameter		
+20°, 10 sec		+
+20°, 50 sec		+
+20°, 100 sec		+
+20°, 1000 sec		+
+77°, 10 sec		+
+77°, 50 sec		+
+77°, 100 sec		+
+77°, 1000 sec		+
+100°, 10 sec		+
+100°, 50 sec		+
+100°, 100 sec		+
+100°, 1000 sec		+
+140°, 10 sec		+
+140°, 50 sec		+
+140°, 100 sec		+
+140°, 1000 sec		+
+180°, 10 sec		+
+180°, 50 sec		+
+180°, 100 sec		+
+180°, 1000 sec		+
Sol Gel		
% Extractables		NS
Density		NS
Gel Swell Ratio		+
Crosslink Density		+
Constant Strain		-
Hardness, Shore A, 10 sec		+
Pressure Time		
Maximum Pressure		-
Time to Maximum Pressure		-
TCLE		
Above T <sub>g</sub>		+
Below T <sub>g</sub>		+
TGA		
Ignition Temperature		+
% Weight Loss at 250°		NS
% Weight Loss at Ignition		+

TABLE 2 (cont)

<u>Test Parameter</u>	Regression Summary	<u>Slope</u>
DTA		
Endotherm 1		-
Exotherm 1		-
Exotherm 2		-
Exotherm 3		+
Ignition Temperature		NS
Burn Rate, 1000 psi		+

NS = Not Significant

- = Negative Slope

+ = Positive Slope

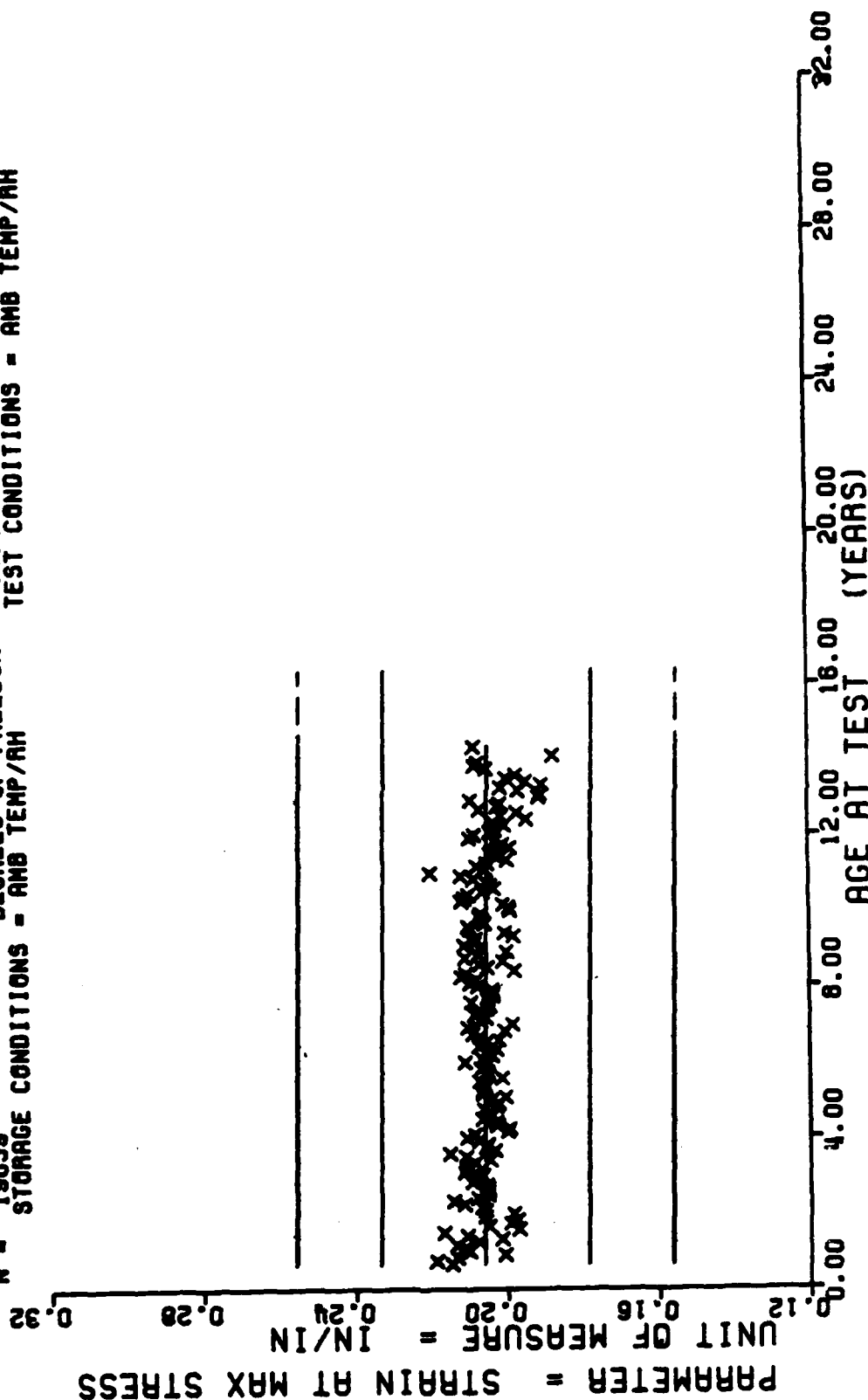
# \*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MOS)	NR SAMP	AGE (MOS)	NP SAMP	AGE (MOS)	NP SAMP	AGE (MOS)	NP SAMP	AGE (MOS)	NP SAMP	AGE (MOS)	NP SAMP	AGE (MOS)	NP SAMP
8	3	33	152	58	352	83	80	108	93	133	82	133	82
9	19	34	154	59	317	84	56	109	120	134	126	134	126
10	11	35	113	60	413	85	76	110	63	135	60	135	60
11	15	36	226	61	290	86	92	111	42	136	51	136	51
12	30	37	147	62	337	87	122	112	139	137	99	137	99
13	48	38	126	63	243	88	139	113	297	138	256	138	256
14	28	39	119	64	160	89	177	114	165	139	157	139	157
15	38	40	122	65	194	90	156	115	133	140	78	140	78
16	46	41	156	66	70	91	107	116	321	141	40	141	40
17	55	42	123	67	43	92	82	117	247	142	45	142	45
18	28	43	142	68	179	93	117	118	149	143	203	143	203
19	49	44	106	69	234	94	95	119	133	144	97	144	97
20	24	45	135	70	287	95	146	120	210	145	12	145	12
21	56	46	122	71	135	96	144	121	123	146	21	146	21
22	27	47	166	72	124	97	150	122	41	147	30	147	30
23	67	48	177	73	110	98	159	123	48	148	40	148	40
24	55	49	199	74	152	99	191	124	45	149	12	149	12
25	63	50	188	75	198	100	163	125	84	150	27	150	27
26	47	51	347	76	147	101	136	126	53	151	51	151	51
27	50	52	314	77	167	102	51	127	107	152	9	152	9
28	56	53	295	78	91	103	68	128	60	153	8	153	8
29	40	54	232	79	117	104	84	129	75	154	27	154	27
30	73	55	474	80	113	105	32	130	104	155	15	155	15
31	88	56	461	81	155	106	11	131	212	156	23	156	23
32	153	57	392	82	174	107	21	132	156	157	12	157	12
										158	21	158	21
										159	28	159	28
										160	9	160	9
										161	33	161	33
										162	18	162	18
										163	9	163	9
										164	9	164	9
										165	18	165	18
										166	20	166	20
										167	18	167	18
										168	3	168	3
										169	2	169	2

WING 6.V.L.F.TENSILE-STEEL AT MAX STRESS.CFS=0.002 IN/IN TC=111011

This sample size summary is applicable to figures 1 thru 4

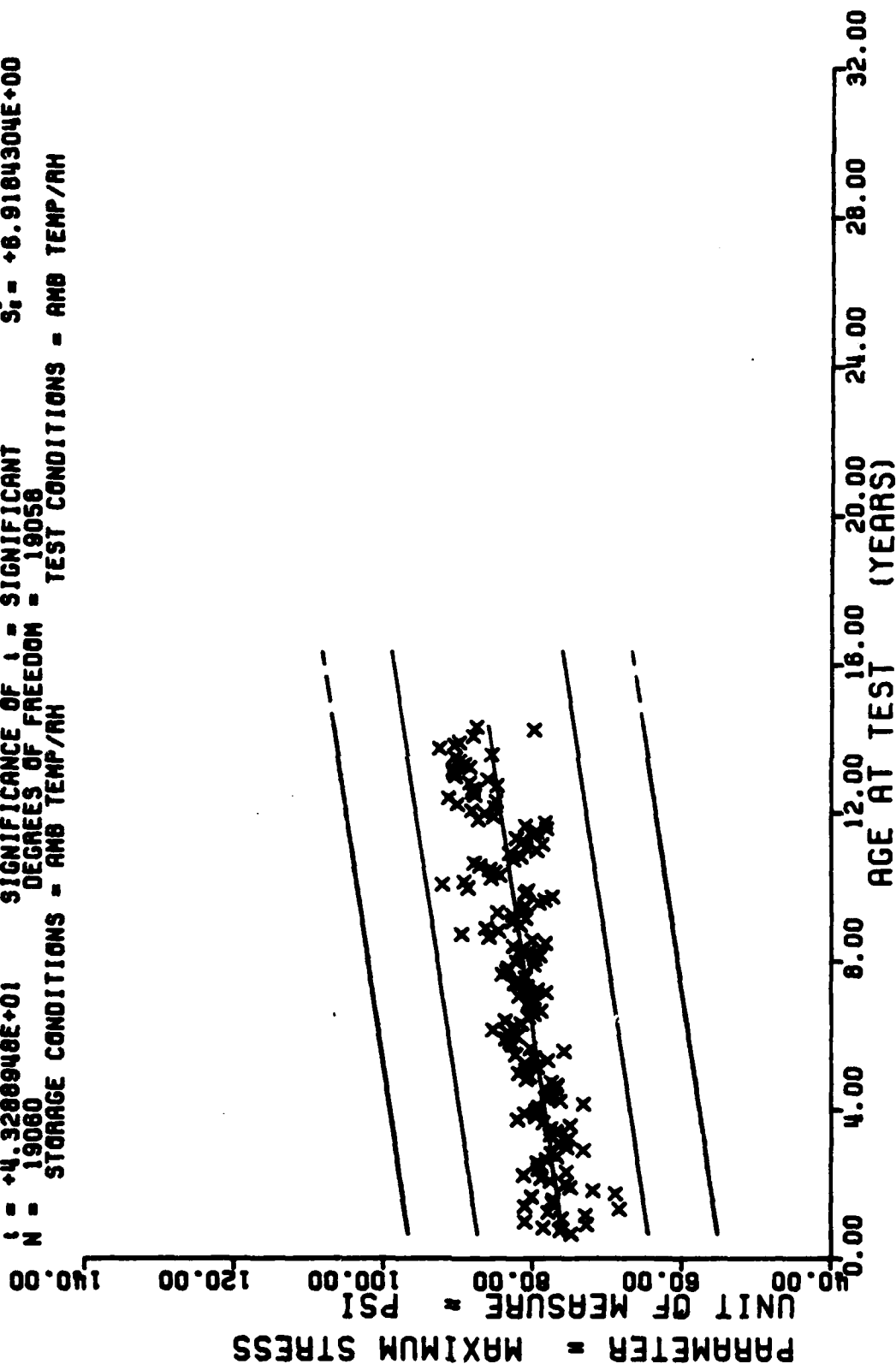
$Y = ((+2.0815015E-01) + (-1.0879858E-05) * X)$   
 $F = +1.0350092E+01$  SIGNIFICANCE OF F = SIGNIFICANT  $G = +1.8545015E-02$   
 $R = -2.3308942E-02$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +3.3803884E-08$   
 $t = +3.2185232E+00$  SIGNIFICANCE OF t = SIGNIFICANT  $S_t = +1.8541754E-02$   
 $N = 19059$  DEGREES OF FREEDOM = 19057  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6.V.L.A. TENSILE, STRAIN AT MAX STRESS, CHS-0.002 IN/MIN TP-H1011

Figure 1

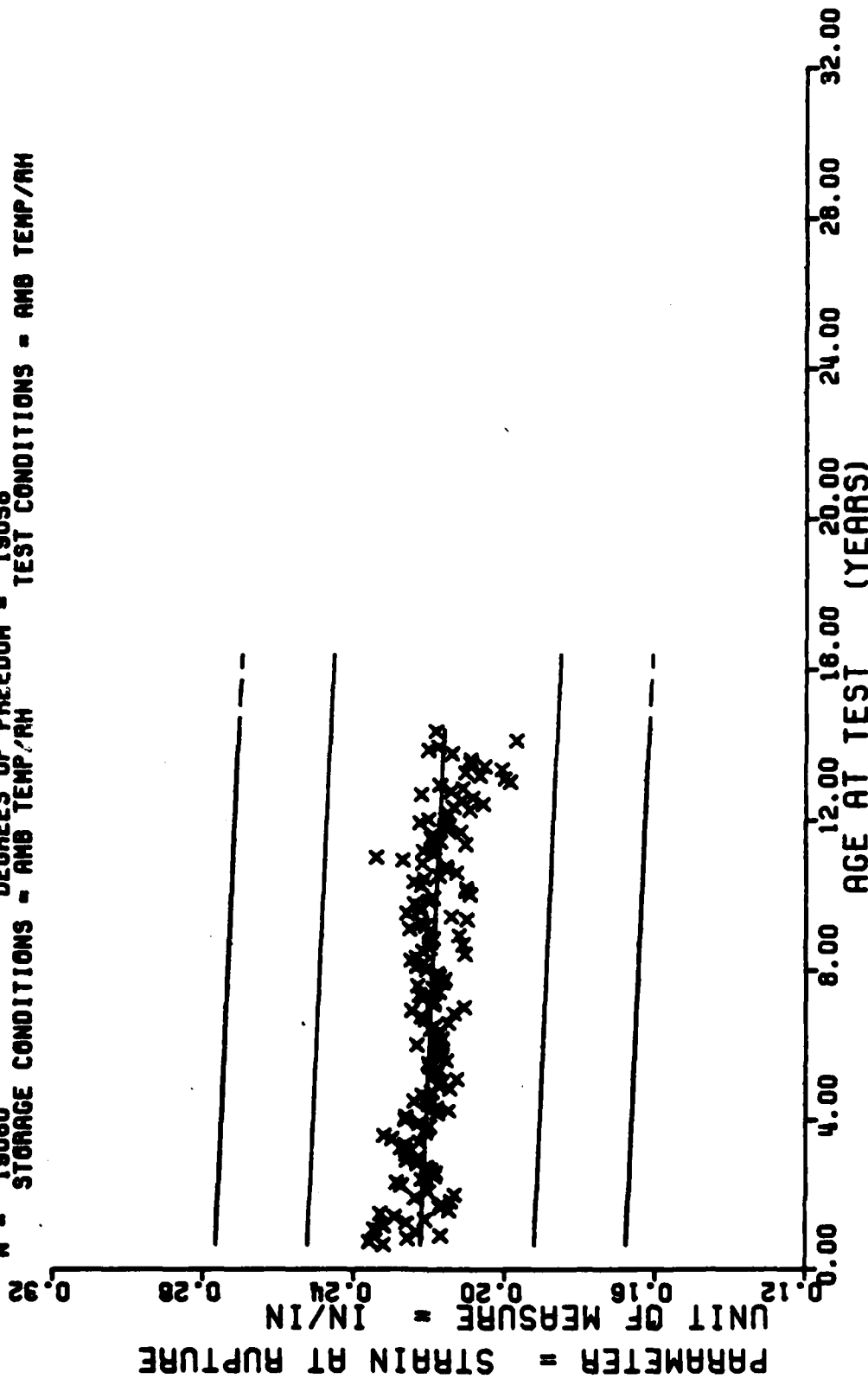
$F = +1.873939E+03$  SIGNIFICANCE OF F = (+8.1201001E-02) \* X)  
 $R = +2.9920742E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +4.3288948E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 19060$  DEGREES OF FREEDOM = 19058  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6 V.L.R. TENSILE, MAXIMUM STRESS, CHS-0.002 IN/MIN TP-H1011

Figure 2

$F = +1.0139808E+02$   
 $R = -7.2740482E-02$   
 $t = +1.0089861E+01$   
 $N = 19060$   
 $Y = ((+2.2259794E-01) + (-3.7958435E-05) \times X)$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF t = SIGNIFICANT  
 DEGREES OF FREEDOM = 19058  
 STORAGE CONDITIONS = AMB TEMP/RH  
 TEST CONDITIONS = AMB TEMP/RH

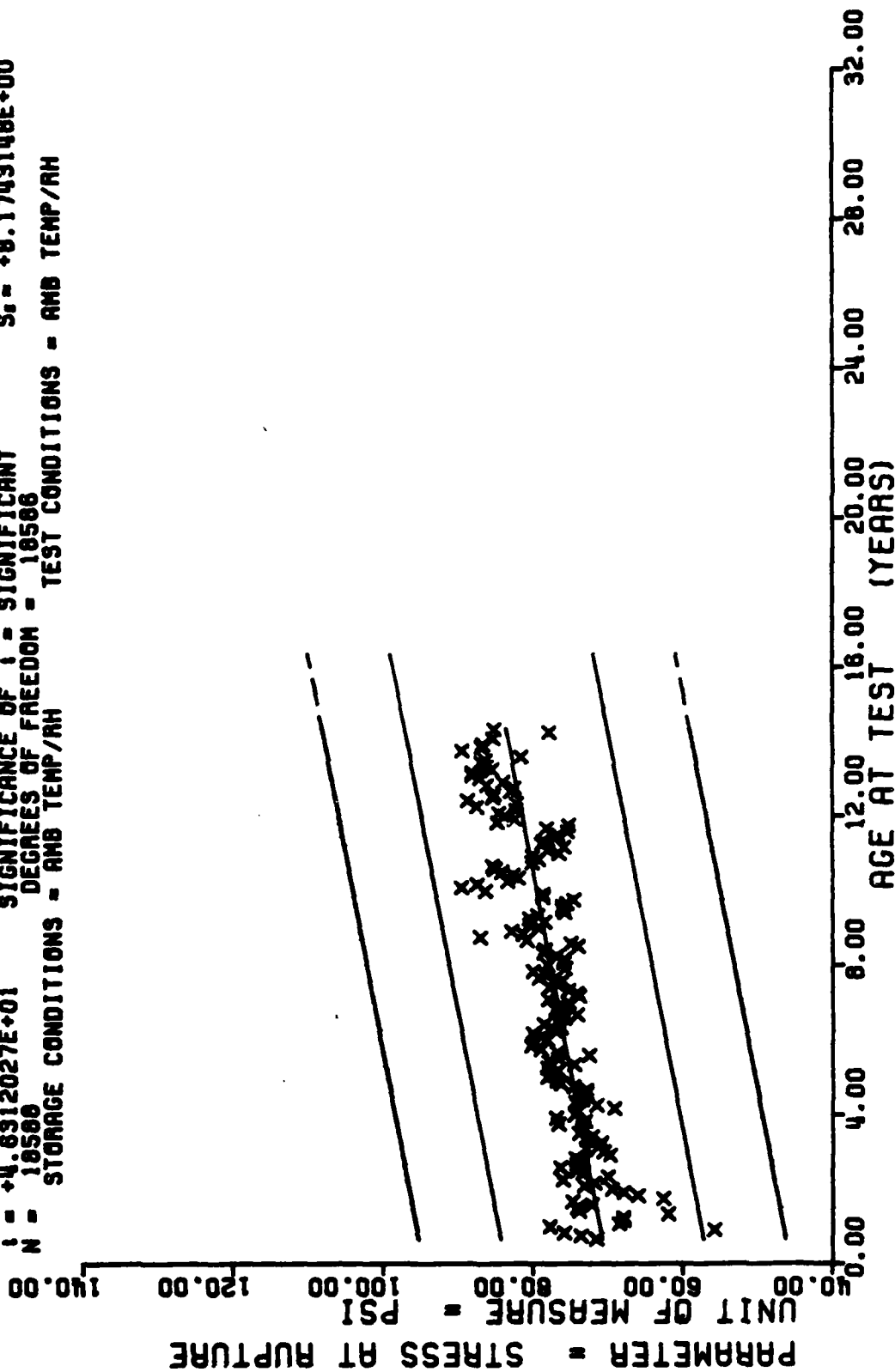


WING 6.V.L.R. TENSILE STRAIN AT RUPTURE, CHS-0.002 IN/MIN TP-H1011

Figure 3



$Y = ((+7.0152230E+01) + (+7.7977452E-02) * X)$   
 $F = +2.1448099E+03$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma = +8.8328617E+00$   
 $R = +3.2165160E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_0 = +1.8837408E-03$   
 $t = +4.6312027E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_1 = +8.1743148E+00$   
 $N = 18588$  DEGREES OF FREEDOM = 18586  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



HING 6.V.L.A. TENSILE, STRESS AT RUPTURE, CHS-0.002 IN/MIN TP-H1011

Figure 4

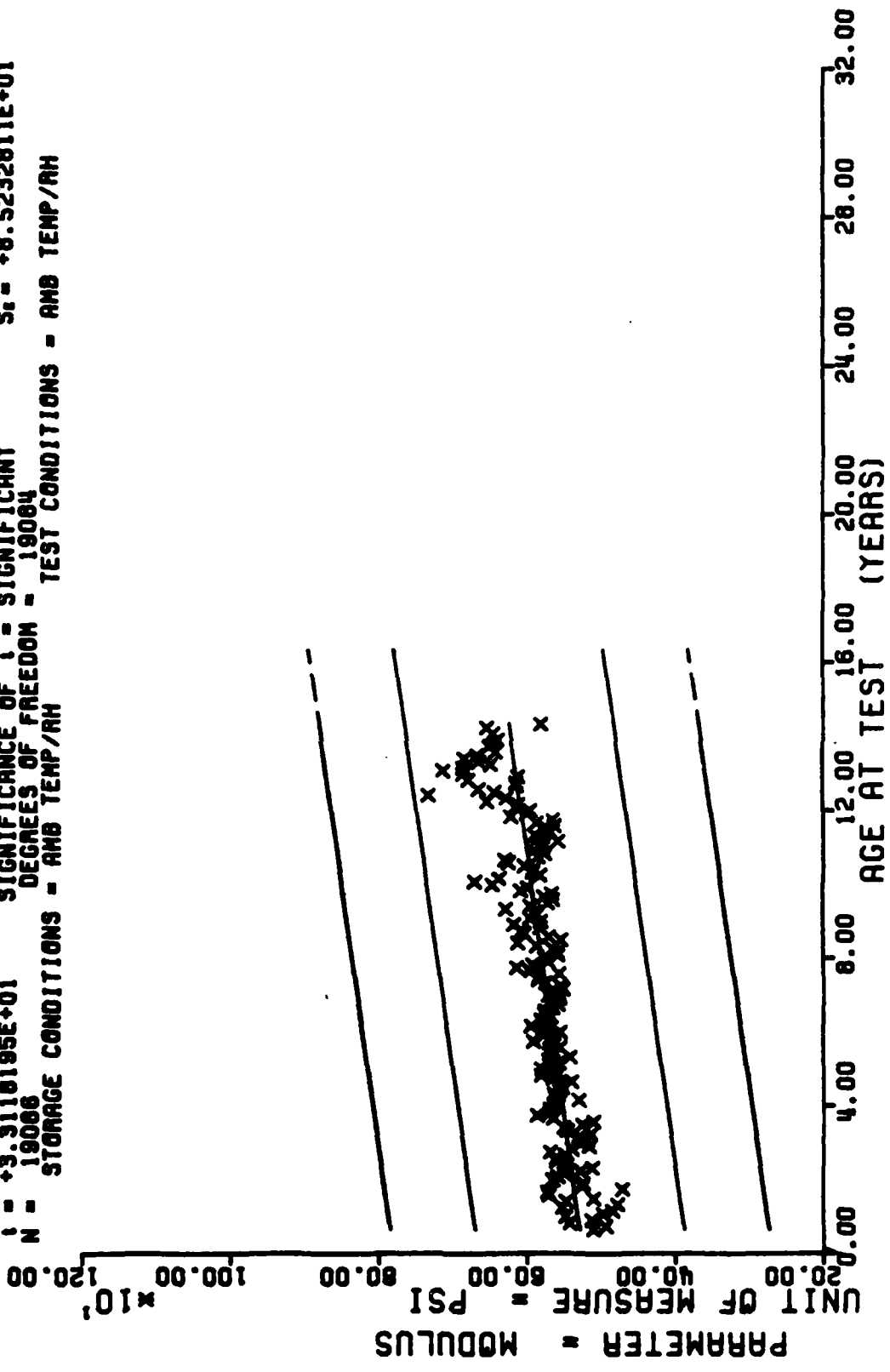
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (YRS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	3	33	152	58	352	83	80	108	93	133	84	133	84
9	19	34	154	59	344	84	56	109	120	134	126	134	126
10	11	35	113	60	442	85	76	110	63	135	60	135	60
11	15	36	226	61	293	86	91	111	42	136	51	136	51
12	30	37	147	62	342	87	122	112	141	137	99	137	99
13	48	38	126	63	259	88	138	113	303	138	256	138	256
14	28	39	119	64	160	89	177	114	168	139	157	139	157
15	35	40	122	65	105	90	156	115	133	140	78	140	78
16	46	41	150	66	79	91	107	116	327	141	40	141	40
17	55	42	123	67	47	92	82	117	250	142	45	142	45
18	28	43	142	68	174	93	117	118	149	143	203	143	203
19	49	44	106	69	234	94	99	119	133	144	97	144	97
20	24	45	135	70	287	95	145	120	192	145	12	145	12
21	56	46	122	71	138	96	188	121	111	146	24	146	24
22	27	47	166	72	121	97	150	122	41	147	30	147	30
23	67	48	177	73	110	98	159	123	48	148	40	148	40
24	55	49	199	74	152	99	191	124	48	149	12	149	12
25	63	50	188	75	198	100	163	125	84	150	27	150	27
26	47	51	347	76	147	101	136	126	53	151	54	151	54
27	50	52	314	77	167	102	51	127	107	152	9	152	9
28	57	53	295	78	89	103	68	128	60	153	8	153	8
29	40	54	232	79	117	104	84	129	75	154	27	154	27
30	73	55	474	80	113	105	33	130	184	155	15	155	15
31	88	56	463	81	155	106	11	131	215	156	23	156	23
32	153	57	390	82	178	107	31	132	156	157	12	157	12
										158	21	158	21
										159	28	159	28
										160	9	160	9
										161	33	161	33
										162	18	162	18
										163	9	163	9
										165	9	165	9
										166	18	166	18
										167	20	167	20
										169	18	169	18
										171	3	171	3
										172	2	172	2

WING 6.V.L.P.TENSILE.MODULUS.CHS=0.002 IN/MIN TP-H1011

This sample size summary is applicable to figure 5

$Y = (( +5.2423603E+02 ) + ( +5.7729032E-01 ) \times X)$   
 $F = +1.0866148E+03$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma_p = +0.7645592E+01$   
 $R = +2.3312954E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +1.7431212E-02$   
 $t = +3.3118195E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_c = +0.5232811E+01$   
 $N = 19086$  DEGREES OF FREEDOM = 19084  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6.V.L.R. TENSILE MODULUS, CHS=0.002 IN/MIN TP-H1011

Figure 5

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	1	33	22	58	40	83	16	108	14	135	18
8	2	34	26	59	31	84	10	109	22	136	4
9	4	35	26	60	45	85	6	110	27	137	17
11	6	36	34	61	35	86	7	111	10	138	60
12	14	37	14	62	57	87	8	112	10	139	38
13	22	38	11	63	54	88	10	113	19	140	10
14	4	39	28	64	42	89	8	114	68	141	8
15	16	40	16	65	18	90	6	115	21	142	6
16	12	41	14	66	27	91	15	116	50	143	26
17	14	42	8	67	32	92	10	117	68	144	43
18	16	43	2	68	32	93	12	118	34	145	6
19	14	44	5	69	34	94	29	119	32	146	8
20	16	45	4	70	43	95	27	120	45	147	4
21	12	46	10	71	17	96	32	121	32	148	2
22	10	47	16	72	26	97	39	122	10	149	6
23	13	48	24	73	32	98	57	123	2	150	6
24	16	49	34	74	40	99	42	125	12	151	8
25	25	50	24	75	43	100	18	127	10	152	5
26	22	51	34	76	18	101	14	128	5	154	4
27	24	52	49	77	19	102	8	129	8	155	2
28	28	53	41	78	22	103	3	130	24	156	4
29	23	54	20	79	20	104	14	131	80	157	12
30	26	55	32	80	17	105	6	132	26	158	2
31	26	56	36	81	29	106	6	133	12	159	2
32	42	57	40	82	24	107	2	134	22	160	4
										161	4
										162	1
										163	2
										165	2
										166	6
										167	4
										169	2
										171	2

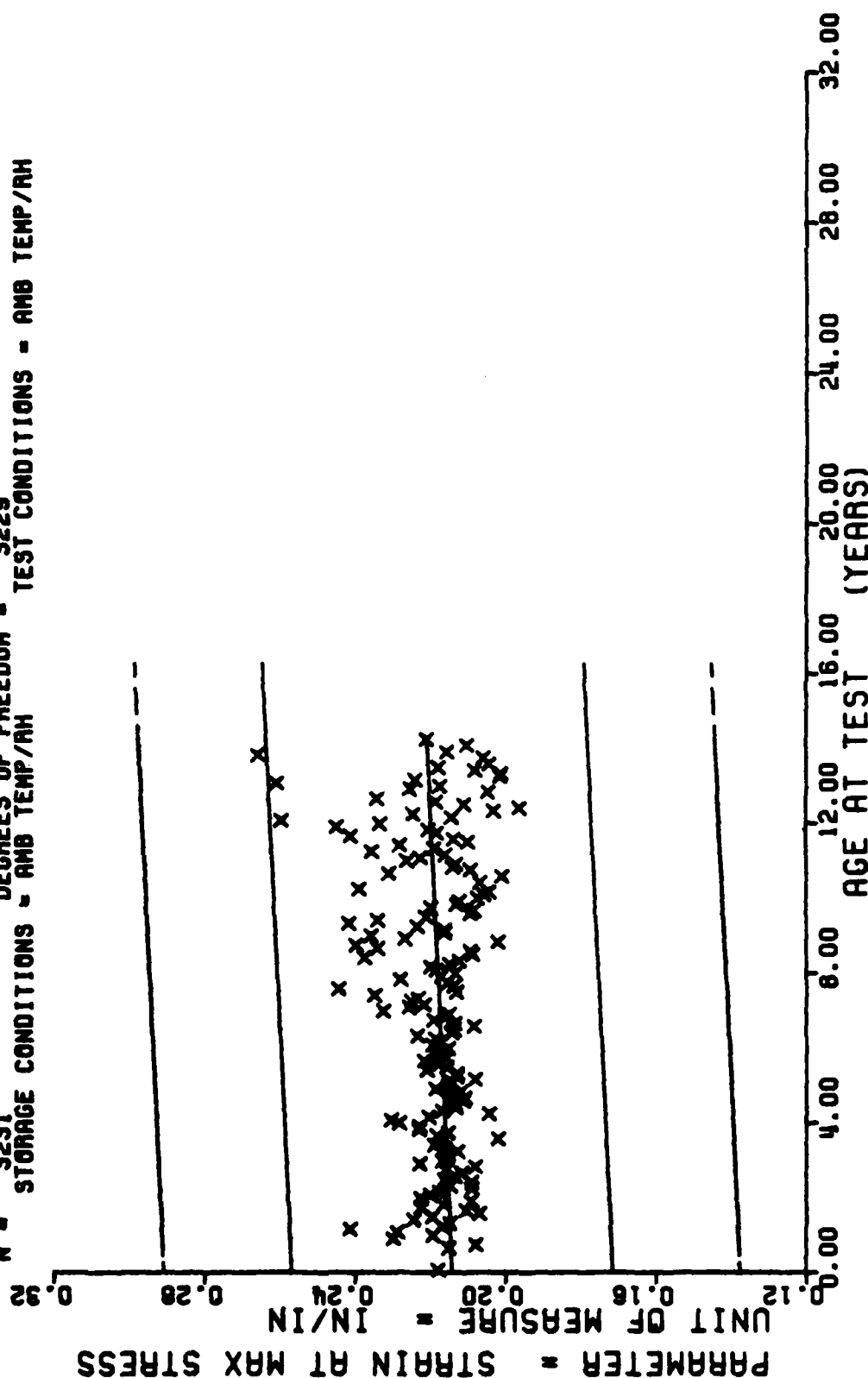
WING 6.L.R.BIAXIAL TENSILE-STRAIN AT MAX STRESS.CHS=0.2 IN/MIN TPH-1011

This sample size summary is applicable to figures 6 thru 10

WING 6.L.R.BIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS=0.2 IN/MIN TPH-1011

This sample size summary is applicable to figures 6 thru 10

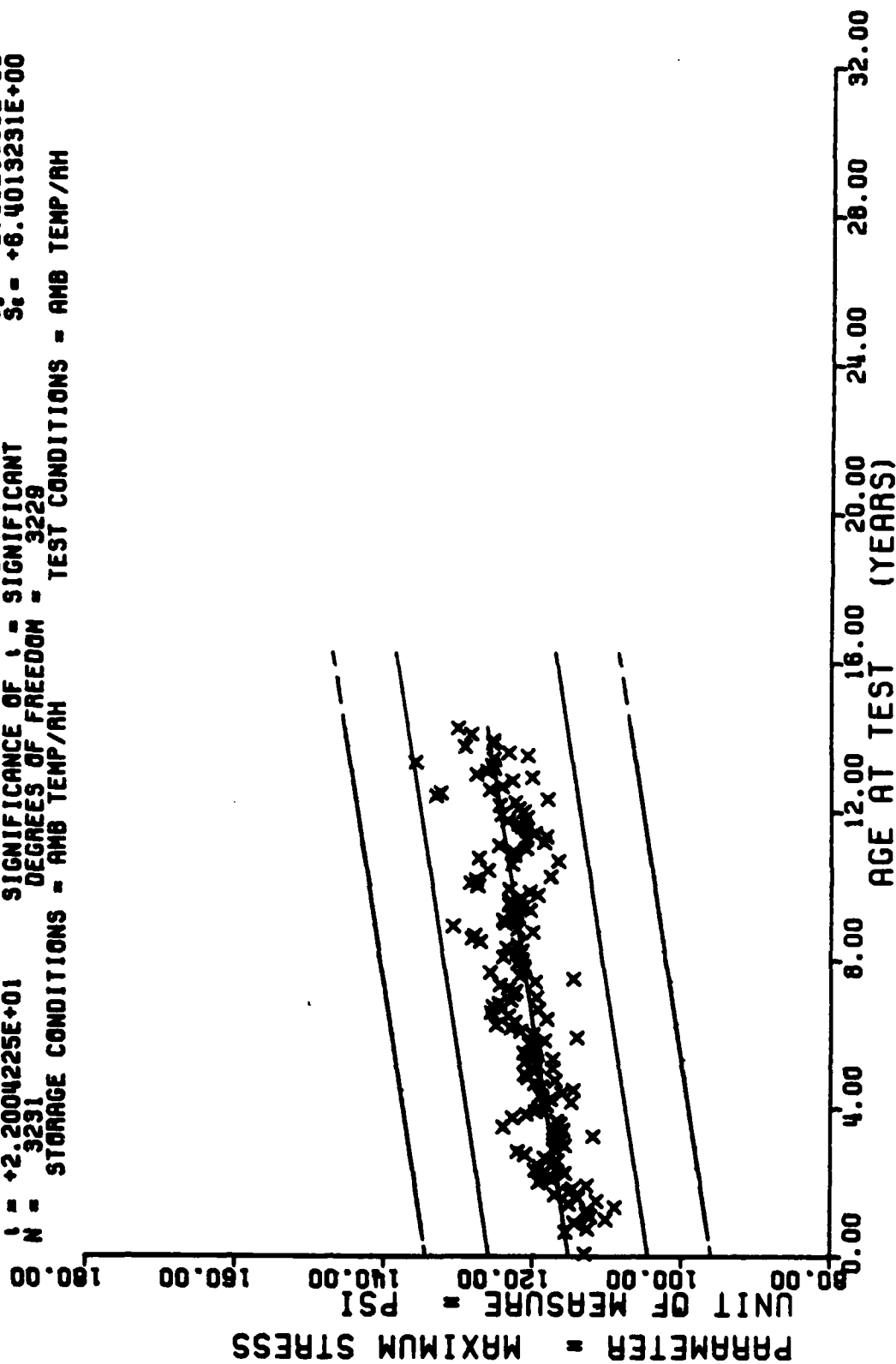
$F = +1.1491708E+01$  SIGNIFICANCE OF F = (+3.9672580E-05) \* X)  
 $R = +5.9550696E-02$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +3.9688422E+00$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 3231$  DEGREES OF FREEDOM = 3229  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6.L.A. BIAXIAL TENSILE, STRAIN AT MAX STRESS, CHS=0.2 IN/MIN TPH-1011

Figure 6

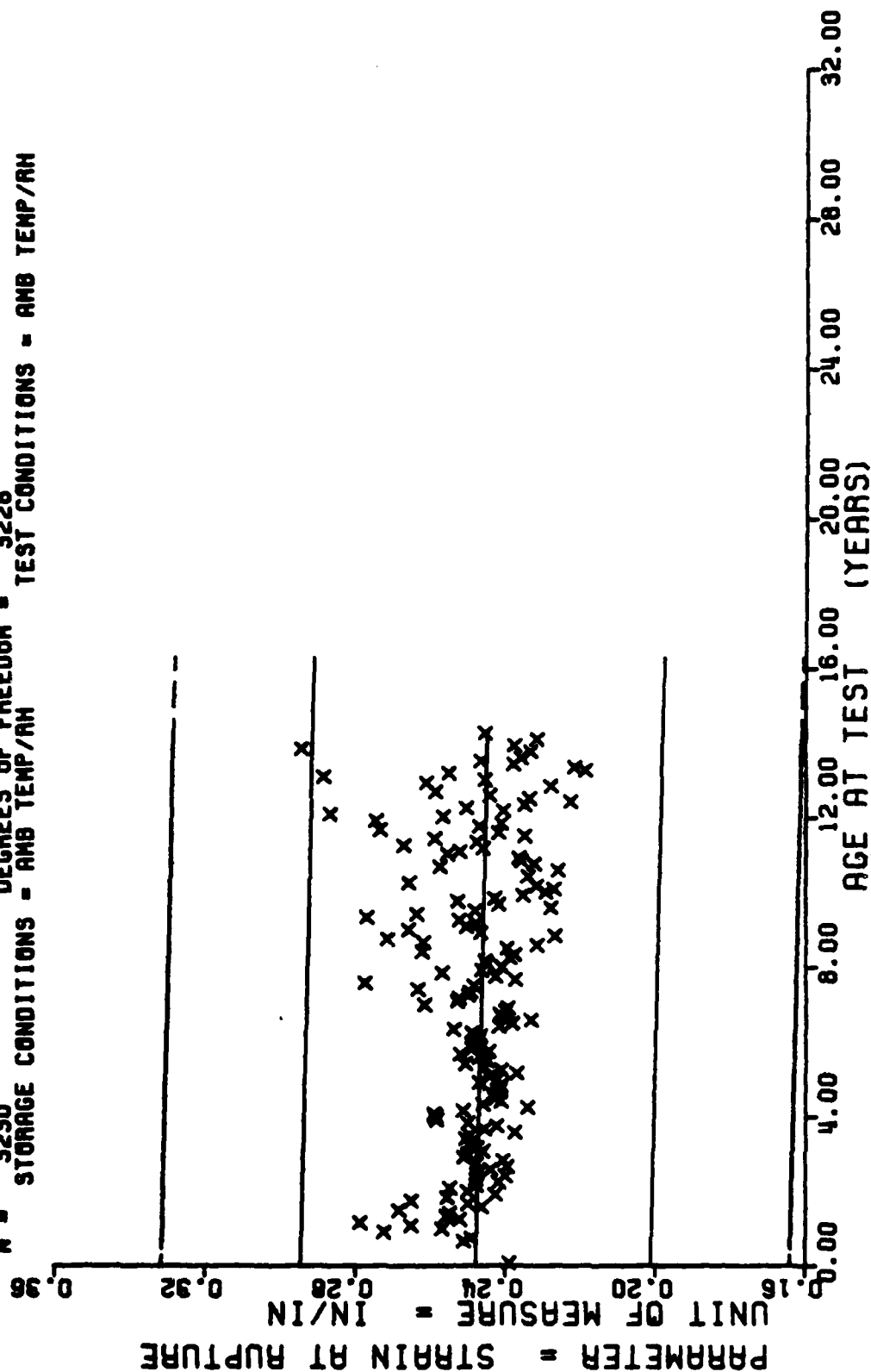
F = +4.0418591E+02  
 R = +3.6110435E-01  
 I = +2.2004225E+01  
 N = 3231  
 Y = (( +1.1515218E+02 ) + ( +6.4520476E-02 ) \* X)  
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF I = SIGNIFICANT  
 DEGREES OF FREEDOM = 3228  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6.L.R. BIAxIAL TENSILE, MAXIMUM STRESS, CHS-0.2 IN/MIN TPH-1011

Figure 7

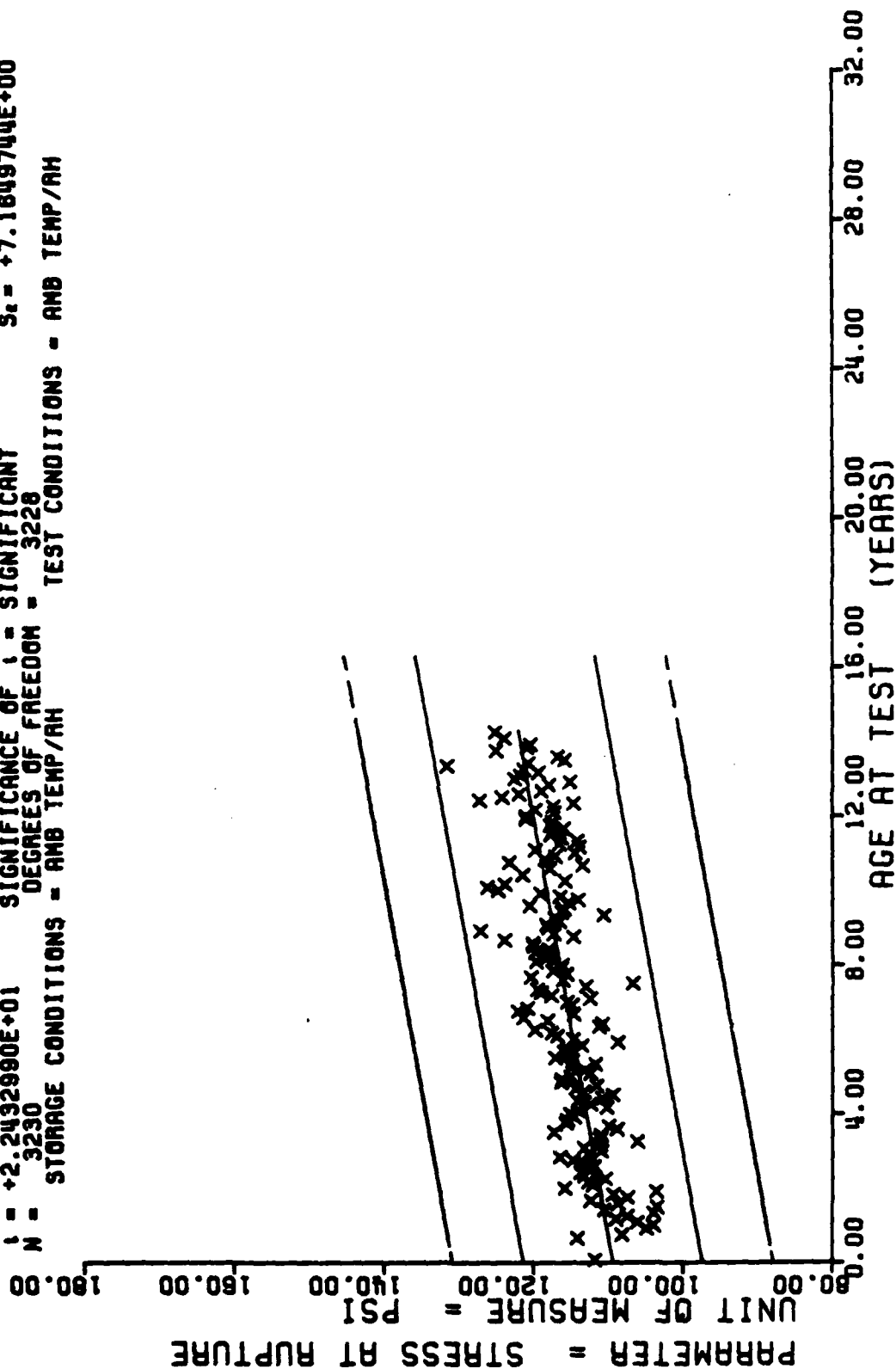
$Y = ((+2.4784654E-01) + (-1.8527455E-05) * X)$   
 $F = +2.1010754E+00$  SIGNIFICANCE OF F = NOT SIGNIFICANT  $\sigma_f = +2.7905083E-02$   
 $R = -2.5504262E-02$  SIGNIFICANCE OF R = NOT SIGNIFICANT  $S_o = +1.2781886E-05$   
 $t = +1.4495087E+00$  SIGNIFICANCE OF t = NOT SIGNIFICANT  $S_t = +2.7900327E-02$   
 $N = 3230$  DEGREES OF FREEDOM = 3228  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6.L.A. BIAxIAL TENSILE STRAIN AT RUPTURE, CHS-0.2 IN/MIN TPH-1011

Figure 8

$Y = ((+1.0937624E+02) + (+7.3635539E-02) \times X)$   
 $F = +5.0323908E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma = +7.7020646E+00$   
 $R = +3.6724901E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +3.2624664E-03$   
 $t = +2.2432980E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_t = +7.1649744E+00$   
 $N = 3230$  DEGREES OF FREEDOM = 3228  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH

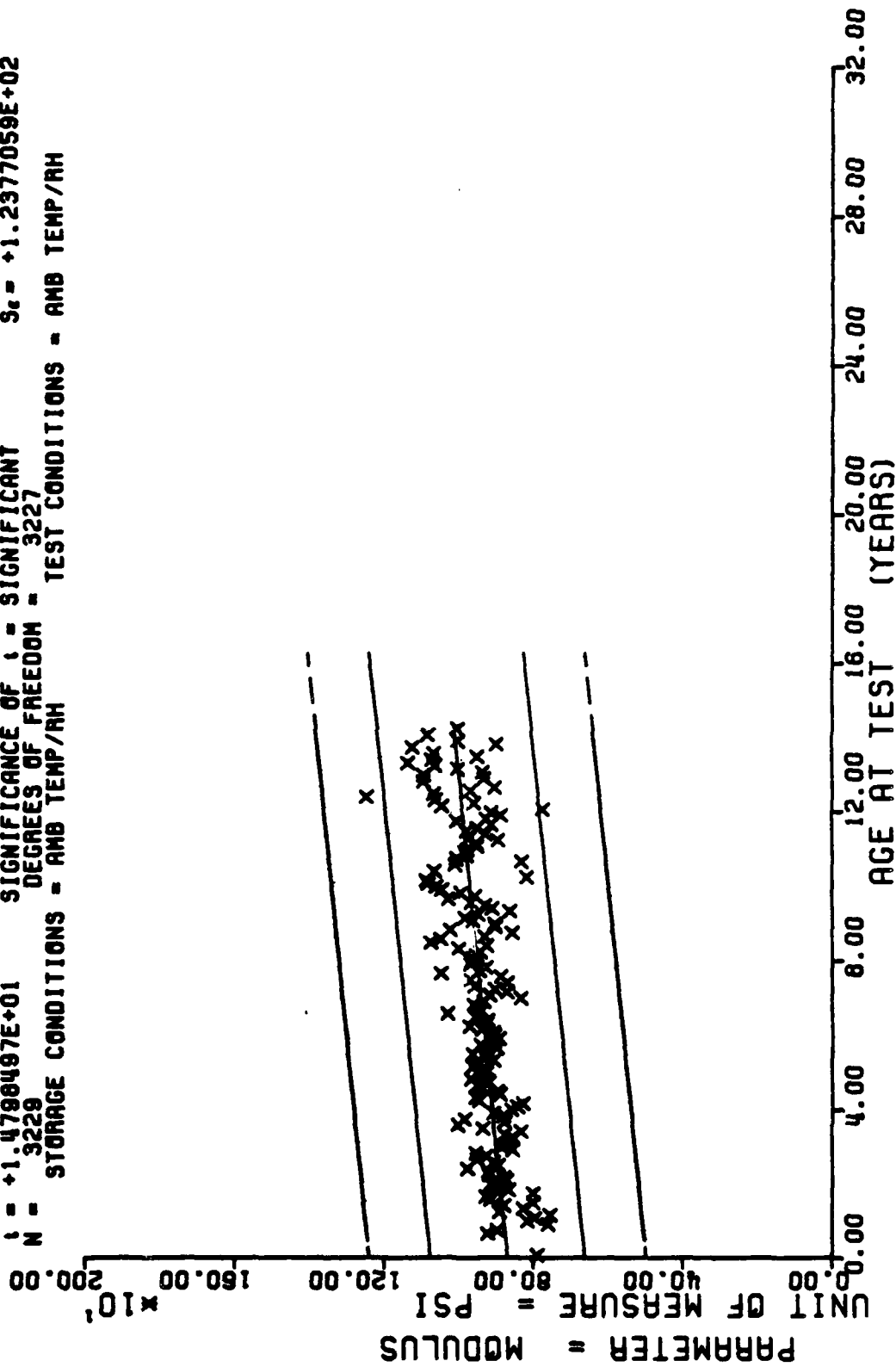


WING 6, L. R. BIAXIAL TENSILE STRESS AT RUPTURE, CHS-0.2 IN/MIN TPH-1011

Figure 9



$Y = ((+8.6900292E+02) + (+8.9985904E-01) \times X)$   
 $F = +2.1899552E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma_s = +1.2788159E+02$   
 $R = +2.5209288E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +5.6739479E-02$   
 $t = +1.4788497E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_e = +1.2377059E+02$   
 $N = 3229$  DEGREES OF FREEDOM = 3227  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6.L.R. BIAxIAL TENSILE, MODULUS, CHS-0.2 IN/MIN TPH-1011

Figure 10

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

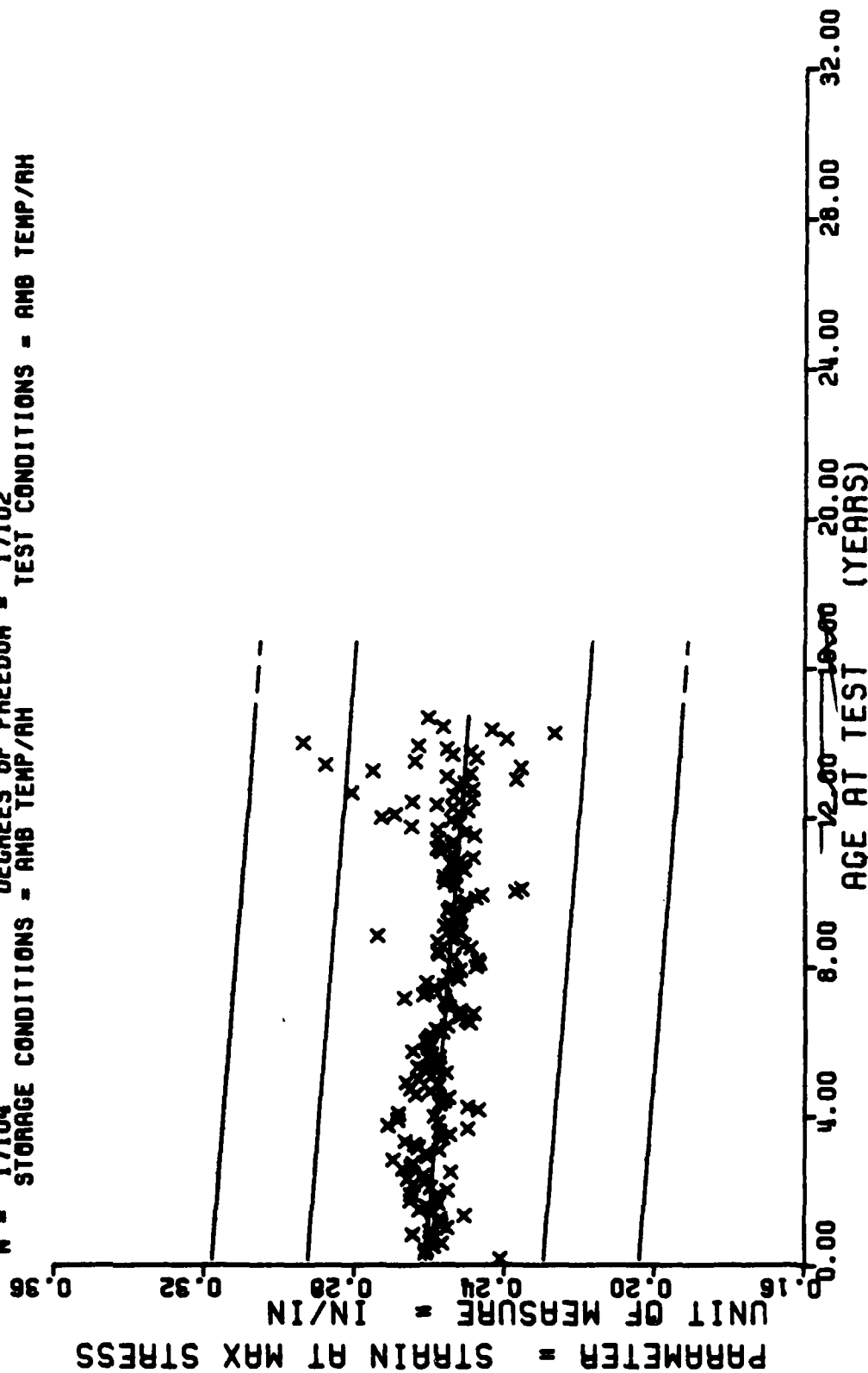
AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
2	3	28	82	53	97	78	177	103	53
4	57	29	55	54	83	79	129	104	81
5	151	30	52	55	143	80	131	105	18
6	191	31	52	56	108	81	179	106	15
7	171	32	124	57	172	82	94	107	27
8	143	33	85	58	158	83	100	108	111
9	194	34	78	59	134	84	75	109	109
10	189	35	44	60	159	85	83	110	62
11	192	36	154	61	189	86	60	111	33
12	220	37	83	62	218	87	153	112	105
13	213	38	39	63	283	88	143	113	129
14	222	39	93	64	134	89	150	114	82
15	223	40	65	65	75	90	117	115	77
16	212	41	35	66	61	91	94	116	282
17	184	42	69	67	104	92	80	117	264
18	26	43	75	68	110	93	81	118	161
19	57	44	21	69	154	94	131	119	117
20	18	45	20	70	188	95	136	120	256
21	78	46	58	71	102	96	239	121	127
22	43	47	106	72	157	97	266	122	38
23	30	48	95	73	162	98	268	123	46
24	77	49	122	74	196	99	153	124	44
25	51	50	108	75	259	100	65	125	60
26	56	51	175	76	161	101	103	126	78
27	79	52	223	77	154	102	22	127	65

Age	Nr	Age	Nr
153	6	162	3
154	27	163	3
155	27	164	6
156	25	165	6
157	23	166	24
158	24	167	12
159	21	168	18
160	21	169	3
161	33	171	9
		172	3
		173	3
		176	3

WING 6.L.F.TENSILE,STRESS AT RUPTURE,CIS=2.0 IN/MIN TP-H1011

This sample size summary is applicable to figures 11 thru 15

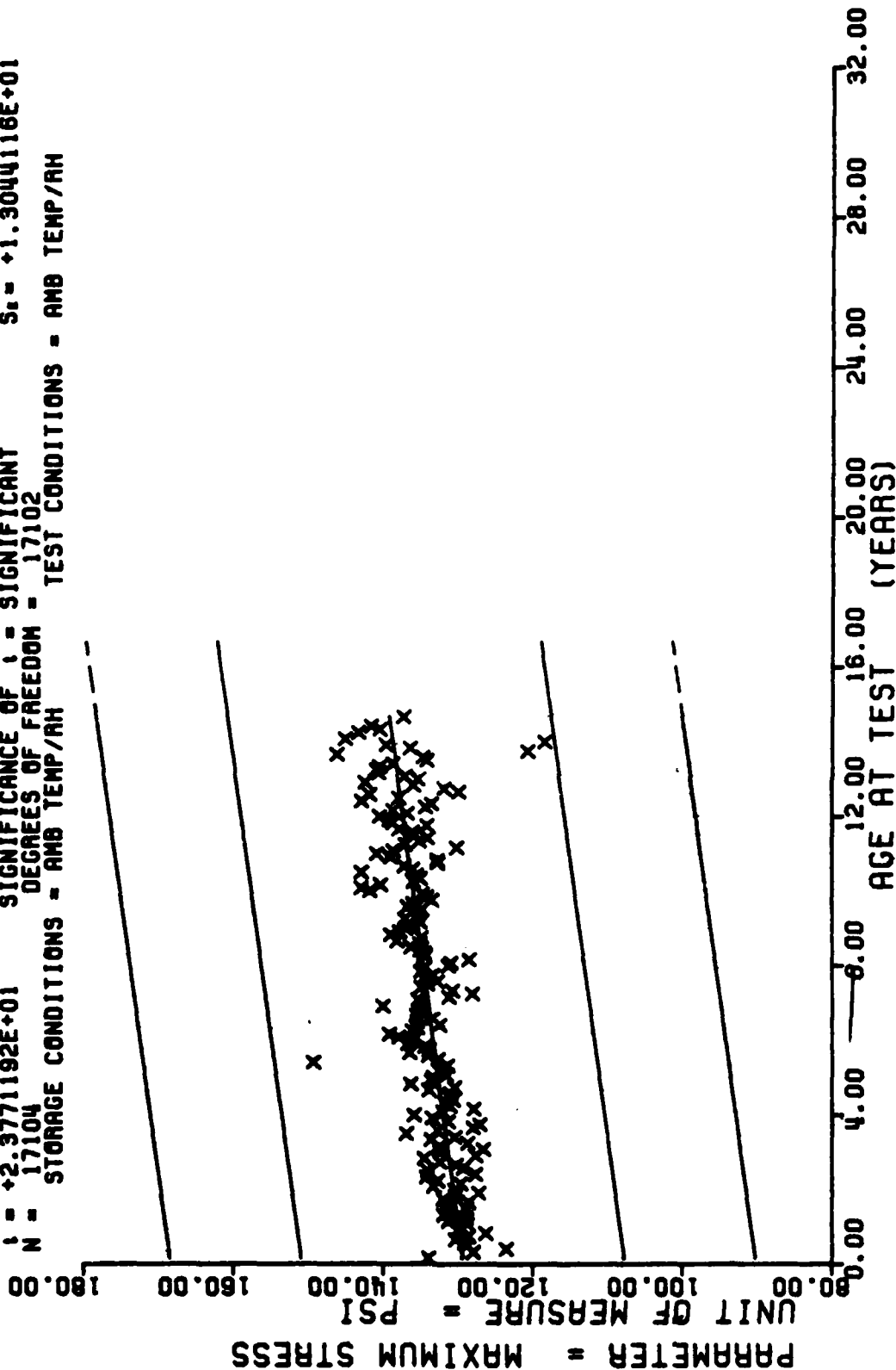
$Y = ((+2.6110309E-01) + (-6.5932529E-05) \times X)$   
 $F = +3.6473836E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma_f = +1.9180993E-02$   
 $R = -1.4450584E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_r = +3.4523038E-06$   
 $t = +1.9098124E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_t = +1.6980224E-02$   
 $N = 17104$  DEGREES OF FREEDOM = 17102  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



HING 6.L.A. TENSILE STRAIN AT MAX STRESS, CHS-2.0 IN/MIN TP-H1011

Figure 11

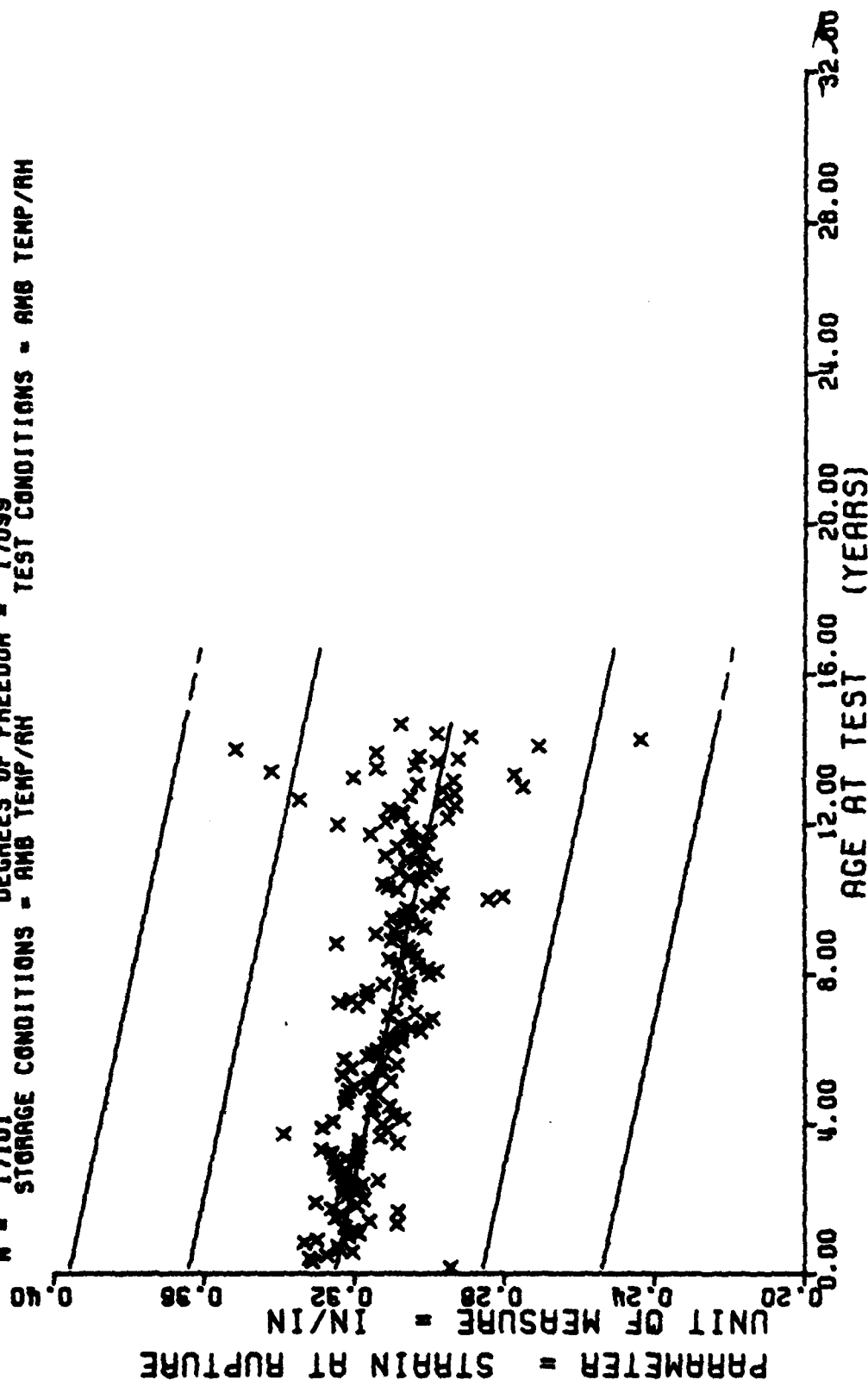
$Y = ((+1.2925931E+02) + (+5.8399247E-02) \cdot X)$   
 $F = +5.6506958E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma = +1.3257473E+01$   
 $R = +1.7884166E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_0 = +2.3725880E-03$   
 $t = +2.3771192E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_1 = +1.3044116E+01$   
 $N = 17104$  DEGREES OF FREEDOM = 17102  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6.L.R. TENSILE, MAXIMUM STRESS, CHS-2.0 IN/MIN TP-H1011

Figure 12

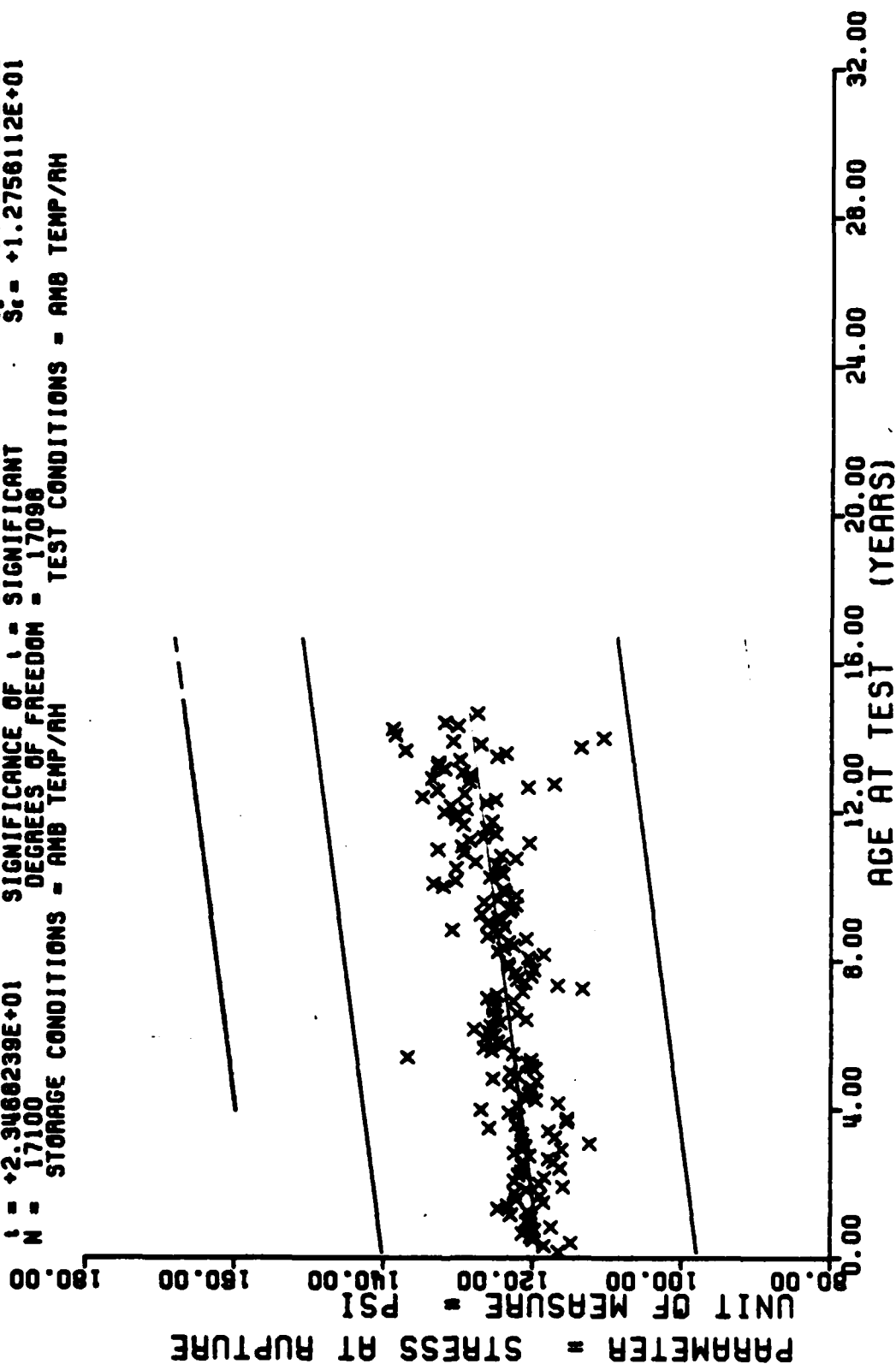
$F = +1.8846424E+03$  SIGNIFICANCE OF F = SIGNIFICANT  $S_1 = +2.4766996E-02$   
 $R = -2.9947733E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_2 = +4.2989050E-06$   
 $t = +4.1044986E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_3 = +2.3630866E-02$   
 $N = 17101$  DEGREES OF FREEDOM = 17099  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6.L.A. TENSILE STRAIN AT RUPTURE, CHS-2.0 IN/MIN TP-H1011

Figure 13

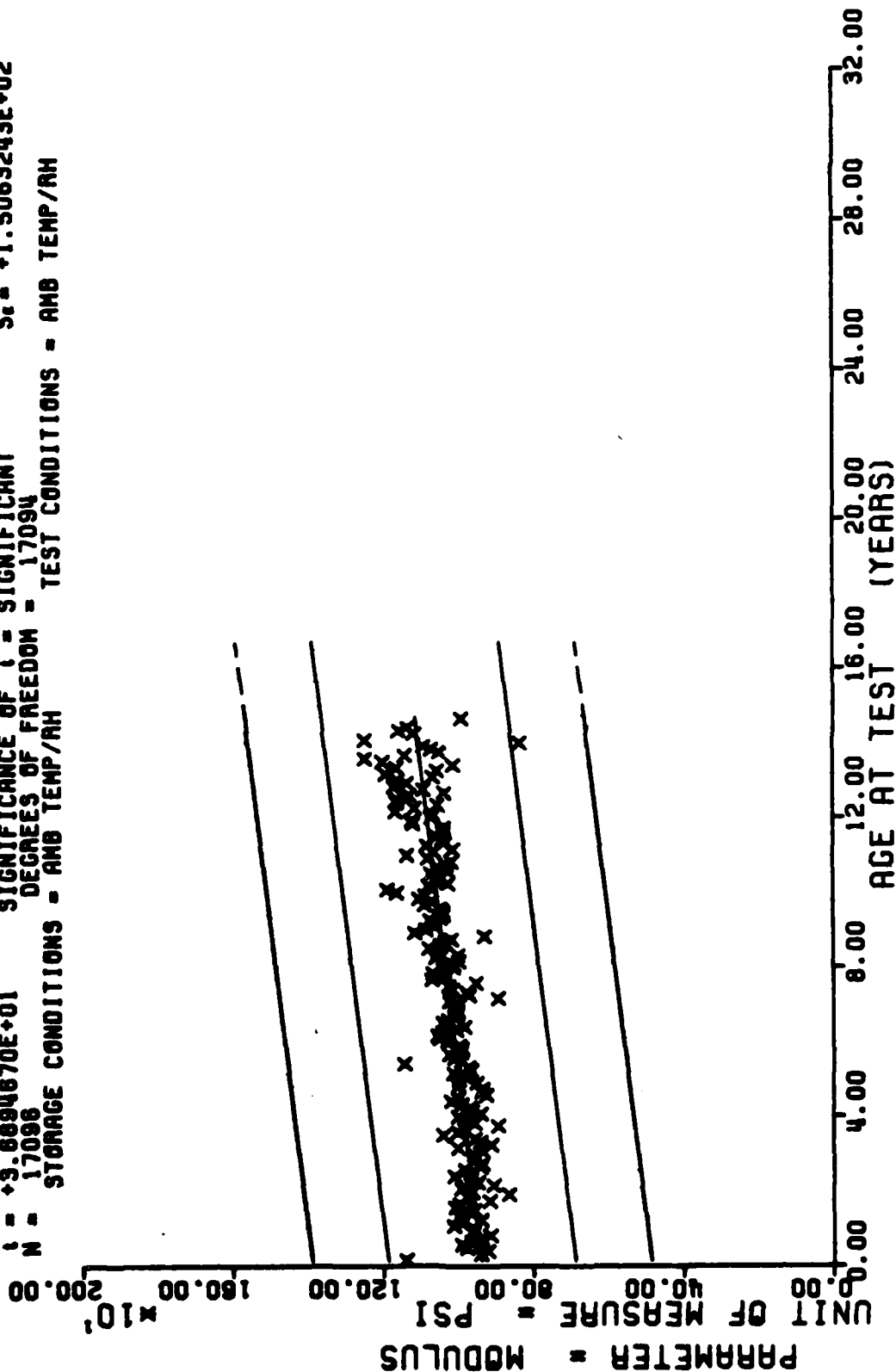
$Y = ((+1.1096031E+02) + (+5.4459713E-02) \cdot X)$   
 $F = +5.5075026E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma^2 = +1.2958553E+01$   
 $R = +1.7865398E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +2.3205708E-03$   
 $t = +2.3468239E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_e = +1.2756112E+01$   
 $N = 17100$  DEGREES OF FREEDOM = 17098  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6.L.A. TENSILE STRESS AT RUPTURE, CHS-2.0 IN/MIN TP-H1011

Figure 14

$F = +1.3612167E+03$  SIGNIFICANCE OF F =  $+1.0108522E+00$  ) \* X)  
 $R = +2.7150392E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +3.6094670E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 17098$  DEGREES OF FREEDOM = 17094  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6.L.A. TENSILE, MODULUS, CHS-2.0 IN/MIN TP-H1011

Figure 15

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

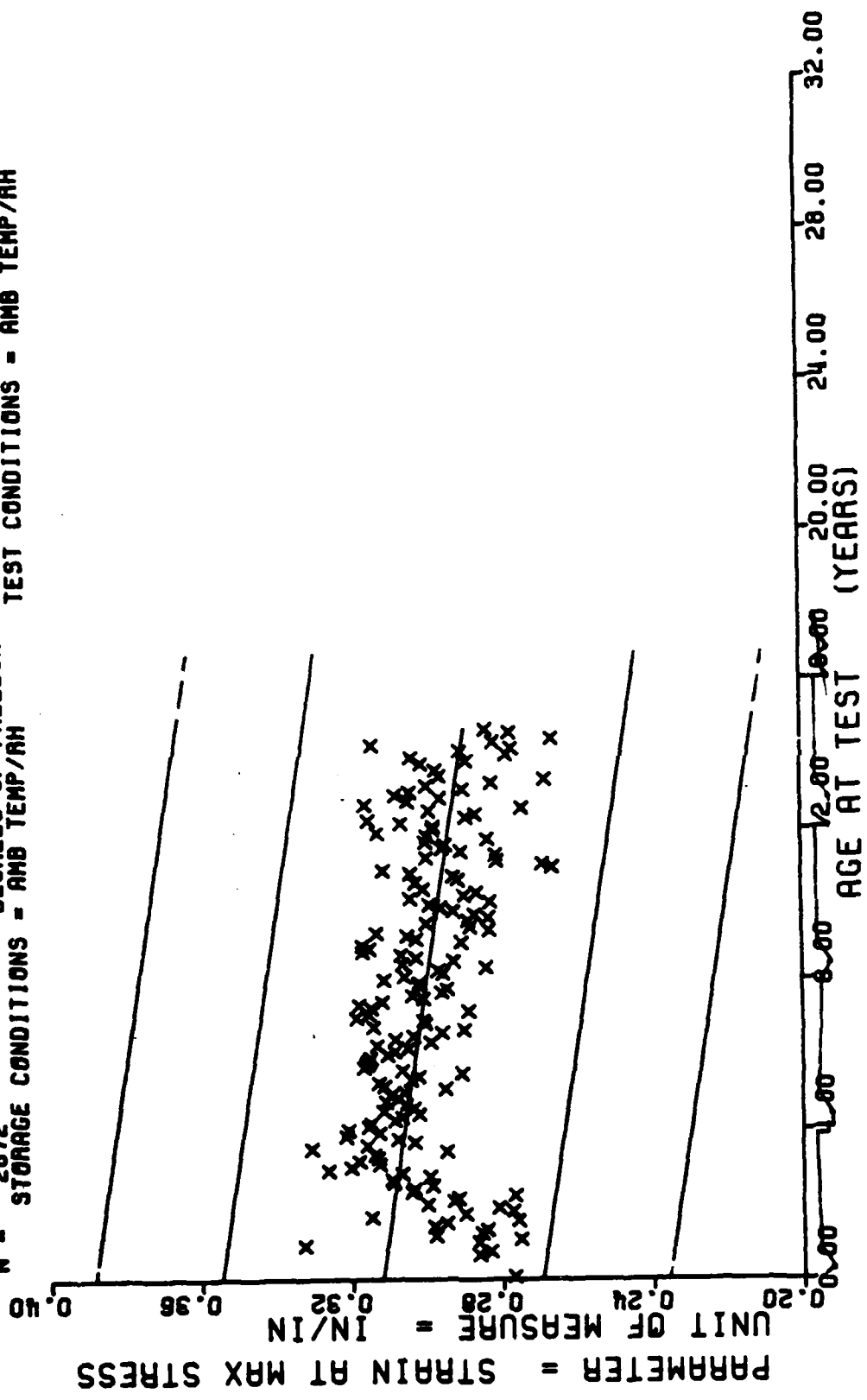
AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	2	33	23	58	30	83	9	108	8	134	18	134	18
8	2	34	22	59	27	84	8	109	21	135	15	135	15
9	4	35	24	60	22	85	14	110	34	136	6	136	6
11	4	36	26	61	36	86	8	111	8	137	10	137	10
12	14	37	16	62	38	87	10	112	8	138	27	138	27
13	17	38	11	63	41	88	16	113	24	139	18	139	18
14	6	39	25	64	42	89	19	114	49	140	6	140	6
15	6	40	10	65	28	90	19	115	55	141	9	141	9
16	8	41	8	66	27	91	27	116	59	142	10	142	10
17	4	42	6	67	28	92	6	117	42	143	6	143	6
18	14	43	2	68	29	93	12	118	23	144	43	144	43
19	11	44	4	69	24	94	16	119	21	145	27	145	27
20	20	45	2	70	59	95	16	120	41	146	8	146	8
21	4	46	6	71	38	96	35	121	8	147	6	147	6
22	10	47	18	72	29	97	37	122	13	148	2	148	2
23	6	48	9	73	44	98	31	123	11	149	6	149	6
24	8	49	34	74	36	99	46	124	2	150	8	150	8
25	23	50	34	75	36	100	20	125	8	151	11	151	11
26	13	51	24	76	26	101	17	127	8	152	4	152	4
27	11	52	42	77	13	102	8	128	8	153	2	153	2
28	17	53	42	78	14	103	6	129	4	154	4	154	4
29	14	54	14	79	27	104	11	130	19	155	4	155	4
30	18	55	30	80	14	105	15	131	18	156	4	156	4
31	16	56	22	81	16	106	10	132	47	157	12	157	12
32	23	57	30	82	22	107	2	133	30	158	1	158	1
										159	4	159	4
										160	6	160	6
										161	8	161	8
										163	2	163	2
										165	2	165	2
										166	3	166	3
										167	4	167	4
										168	7	168	7
										169	2	169	2
										170	3	170	3
										171	2	171	2
										172	4	172	4
										173	2	173	2
										175	2	175	2
										176	4	176	4

WING 6.H.R.TRIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS-1750 IN/MIN,800 PSI

This sample size summary is applicable to figures 16 thru 20



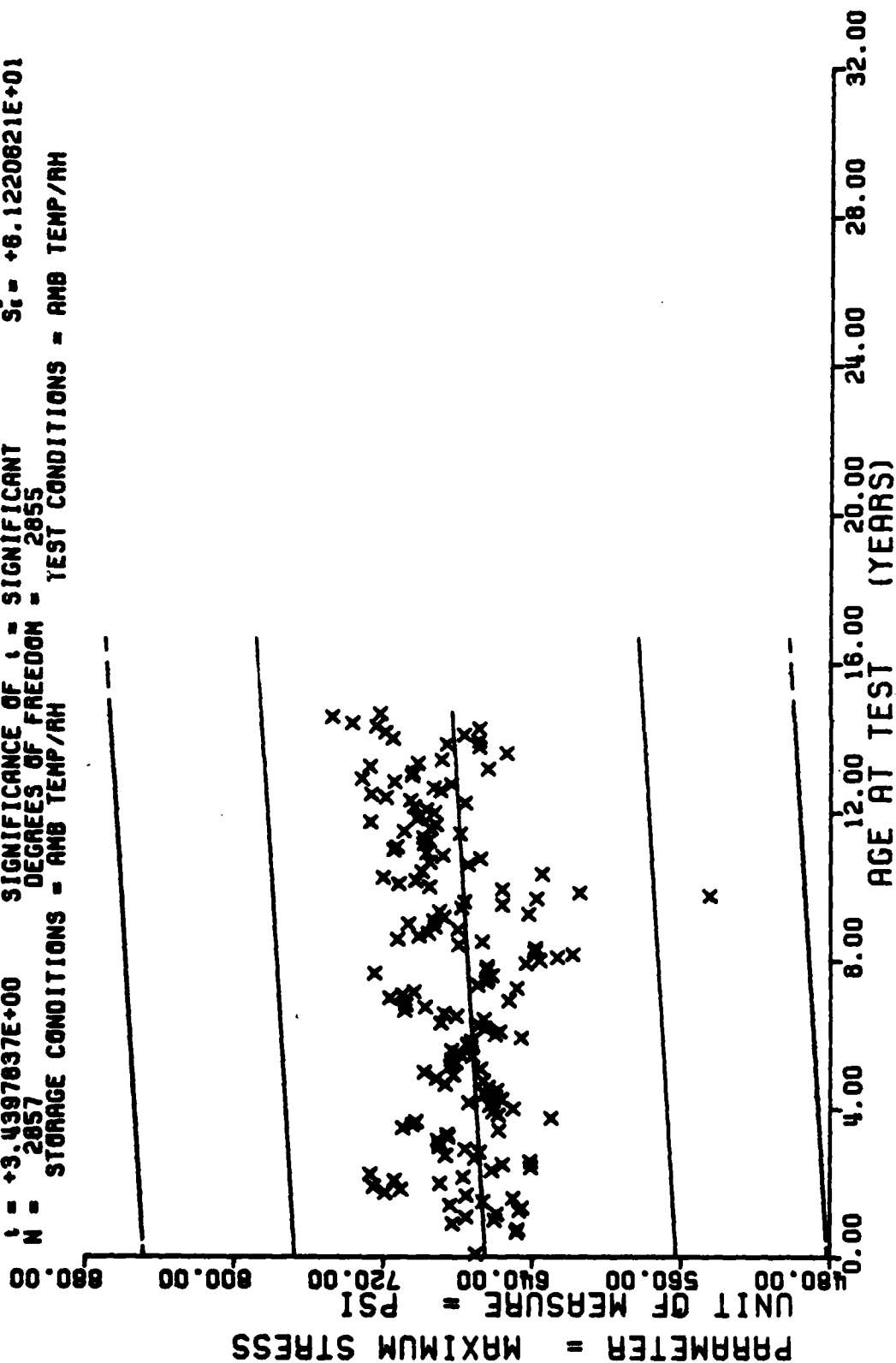
$Y = ((+3.1211809E-01) + (-1.2955906E-04) * X)$   
 $F = +1.0731511E+02$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = -1.8985325E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +1.0359300E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 2672$  DEGREES OF FREEDOM = 2670  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6.H.A. TRIAXIAL TENSILE, STRAIN AT MAX STRESS, CHS-1750 IN/MIN, 800 PSI

Figure 16

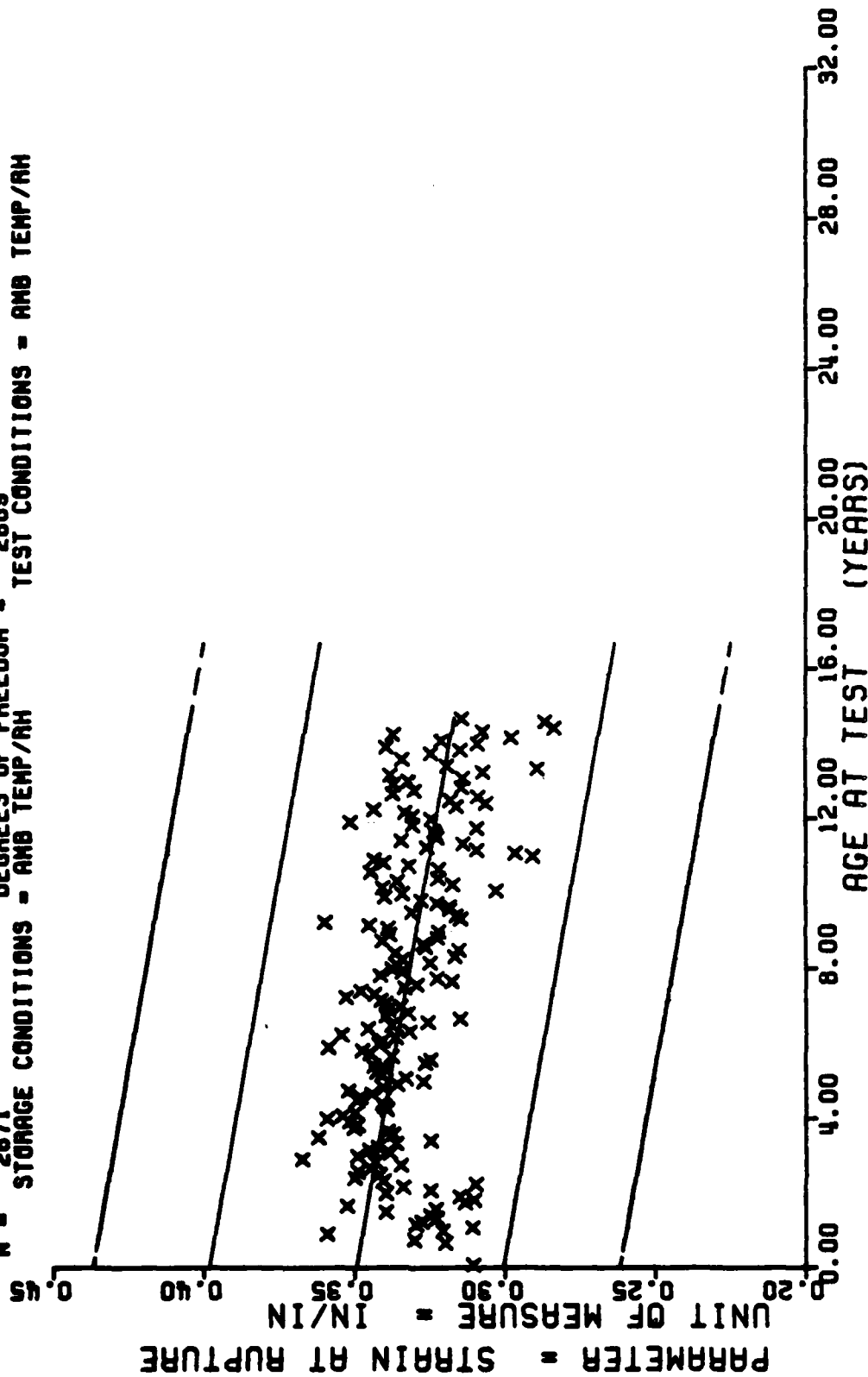
$Y = (( +6.8499538E+02 ) + ( +1.0389864E-01 ) \times X)$   
 $F = +1.1832112E+01$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma^2 = +6.1338608E+01$   
 $R = +6.4243621E-02$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +3.0146850E-02$   
 $t = +3.4397637E+00$  SIGNIFICANCE OF t = SIGNIFICANT  $S_t = +6.1220821E+01$   
 $N = 2857$  DEGREES OF FREEDOM = 2855  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6.H.R.TRIAXIAL TENSILE, MAXIMUM STRESS, CHS-1750 IN/MIN, 800 PSI

Figure 17

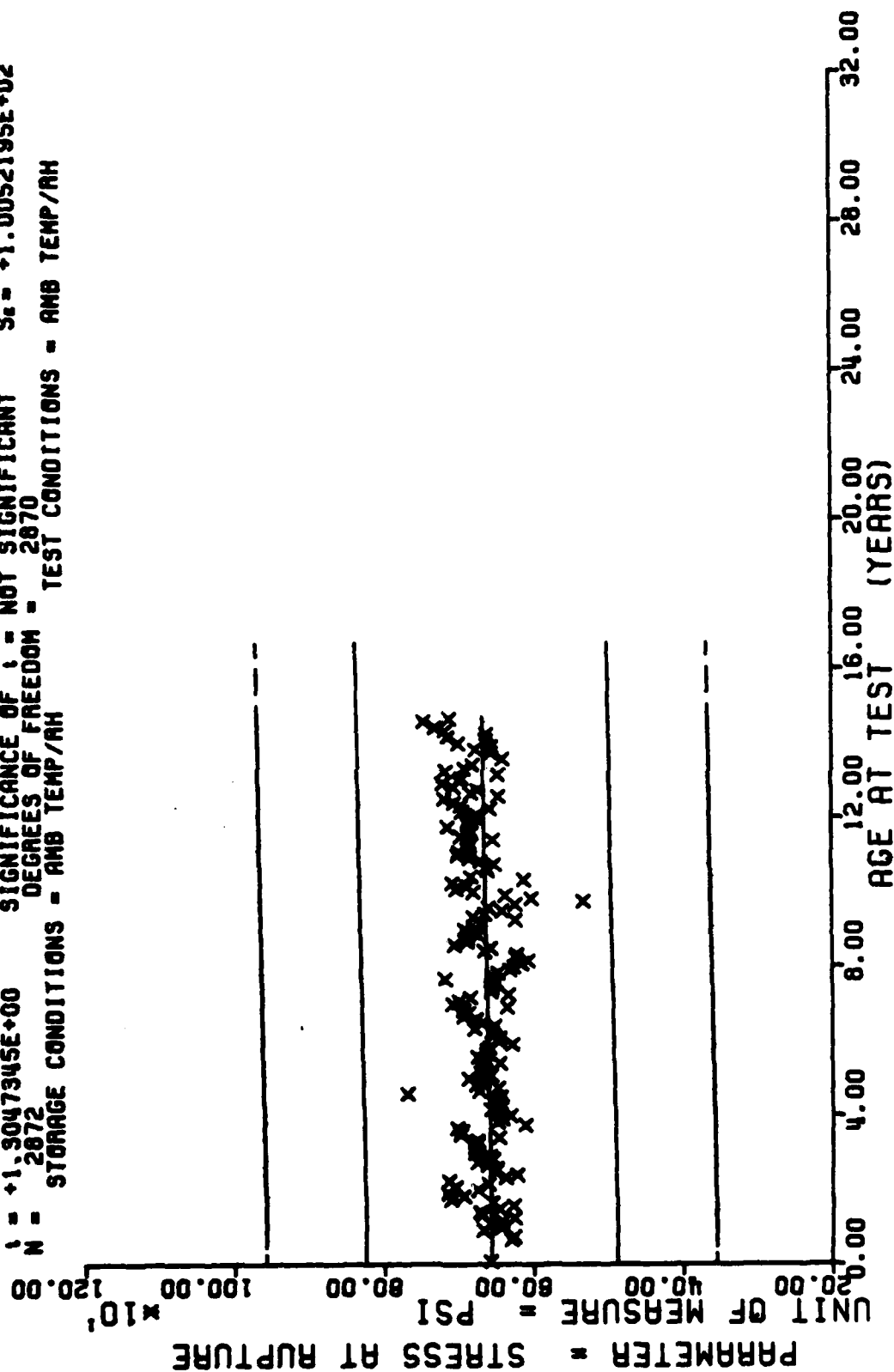
$Y = ((+3.4935257E-01) + (-1.0522286E-04) * X)$   
 $F = +1.6874513E+02$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = -2.3436563E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +1.2912903E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 2871$  DEGREES OF FREEDOM = 2869  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6,H.R. TRIAXIAL TENSILE, STRAIN AT RUPTURE, CHS-1750 IN/MIN, 800 PSI

Figure 18

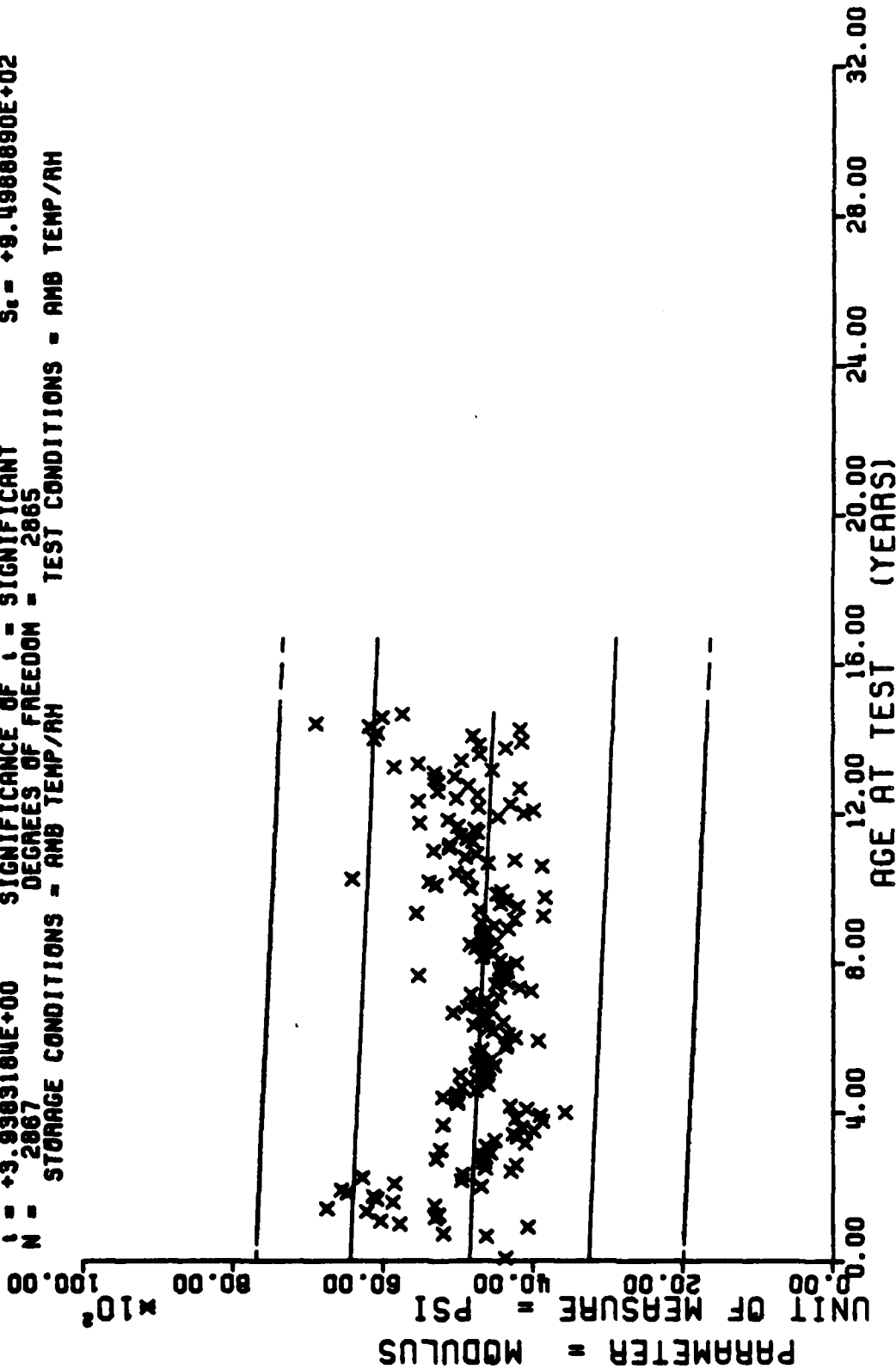
$Y = ((+8.5575793E+02) + (+8.4538214E-02) * X)$   
 $F = +1.7029321E+00$  SIGNIFICANCE OF F = NOT SIGNIFICANT  $G = +1.0053424E+02$   
 $R = +2.4347391E-02$  SIGNIFICANCE OF R = NOT SIGNIFICANT  $S_0 = +4.9463099E-02$   
 $I = +1.3047345E+00$  SIGNIFICANCE OF I = NOT SIGNIFICANT  $S_1 = +1.0052195E+02$   
 $N = 2872$  DEGREES OF FREEDOM = 2870  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6.H.A. TRIAXIAL TENSILE STRESS AT RUPTURE. CHS-1750 IN/MIN. 800 PSI

Figure 19

$F = +1.5510952E+01$  SIGNIFICANCE OF F = SIGNIFICANT  $\alpha = +9.5229047E+02$   
 $R = -7.3379790E-02$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +4.6785814E-01$   
 $I = +3.9383184E+00$  SIGNIFICANCE OF I = SIGNIFICANT  $S_e = +9.4988890E+02$   
 $N = 2867$  DEGREES OF FREEDOM = 2865  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6.H.A. TRIAXIAL TENSILE MODULUS, CHS-1750 IN/MIN AT 800 PSI

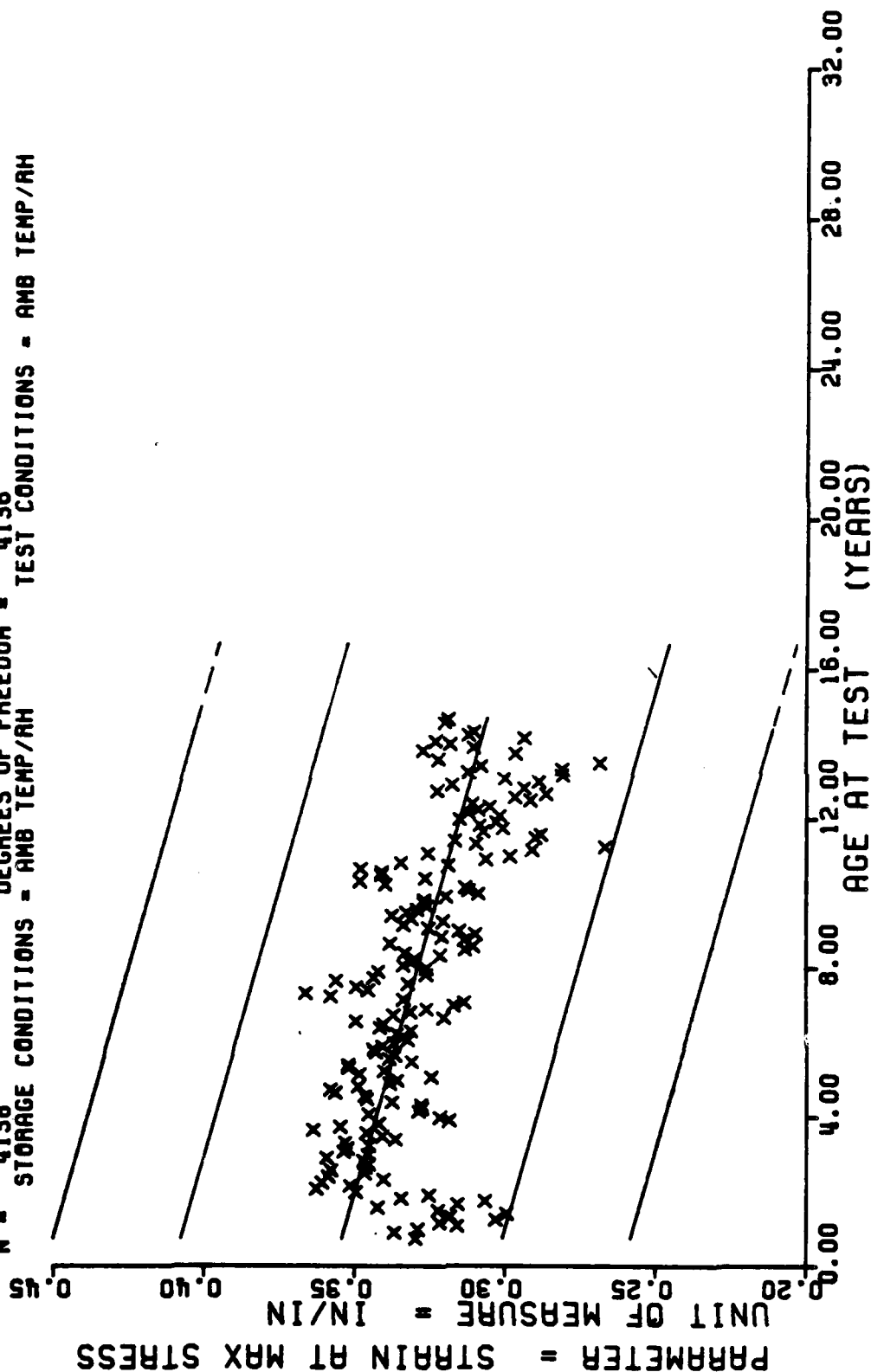
Figure 20

[illegible]

WITHIN 6.0 MPa HYDROSTATIC STRAIN AT MAX 5THF 55, 1750 IN/MIN, 300 PSI

This sample size summary is applicable to figures 21 thru 25

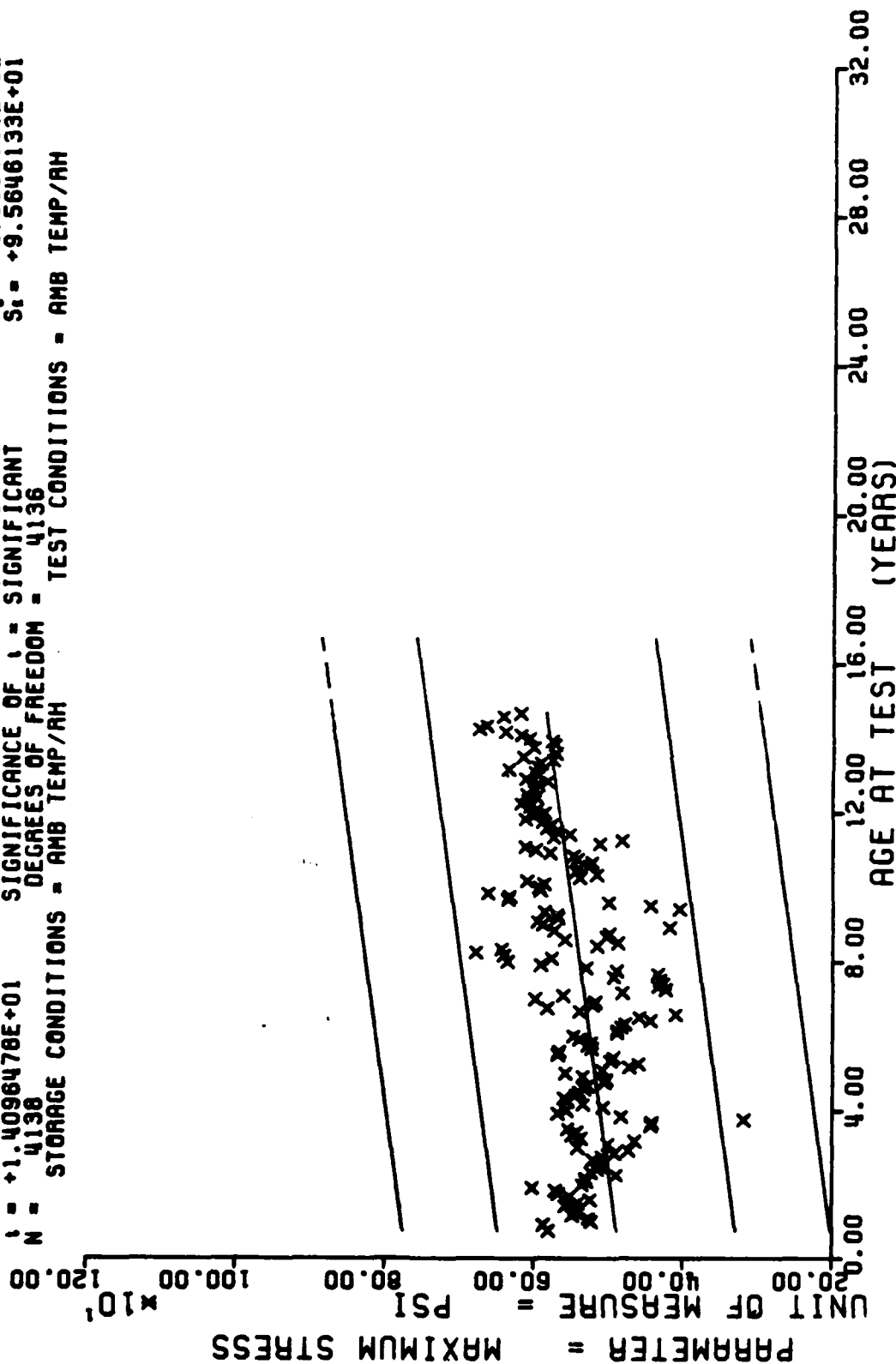
$Y = ((+3.5689045E-01) + (-2.8887625E-04) \cdot X)$   
 $F = +4.5380659E+02$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = -3.1444028E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +2.1302735E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 4136$  DEGREES OF FREEDOM = 4136  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



WING 6.H.R. HYDROSTATIC STRAIN AT MAX STRESS, 1750 IN/MIN, 800 PSI

Figure 21

$Y = ((+4.8368116E+02) + (+5.7175810E-01) * X)$   
 $F = +1.9871069E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma_r = +9.790498E+01$   
 $R = +2.1410685E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +4.0560351E-02$   
 $t = +1.4096478E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_t = +9.5646133E+01$   
 $N = 4138$  DEGREES OF FREEDOM = 4136  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6.H.A. HYDROSTATIC, MAXIMUM STRESS, 1750 IN/MIN, 800 PSI

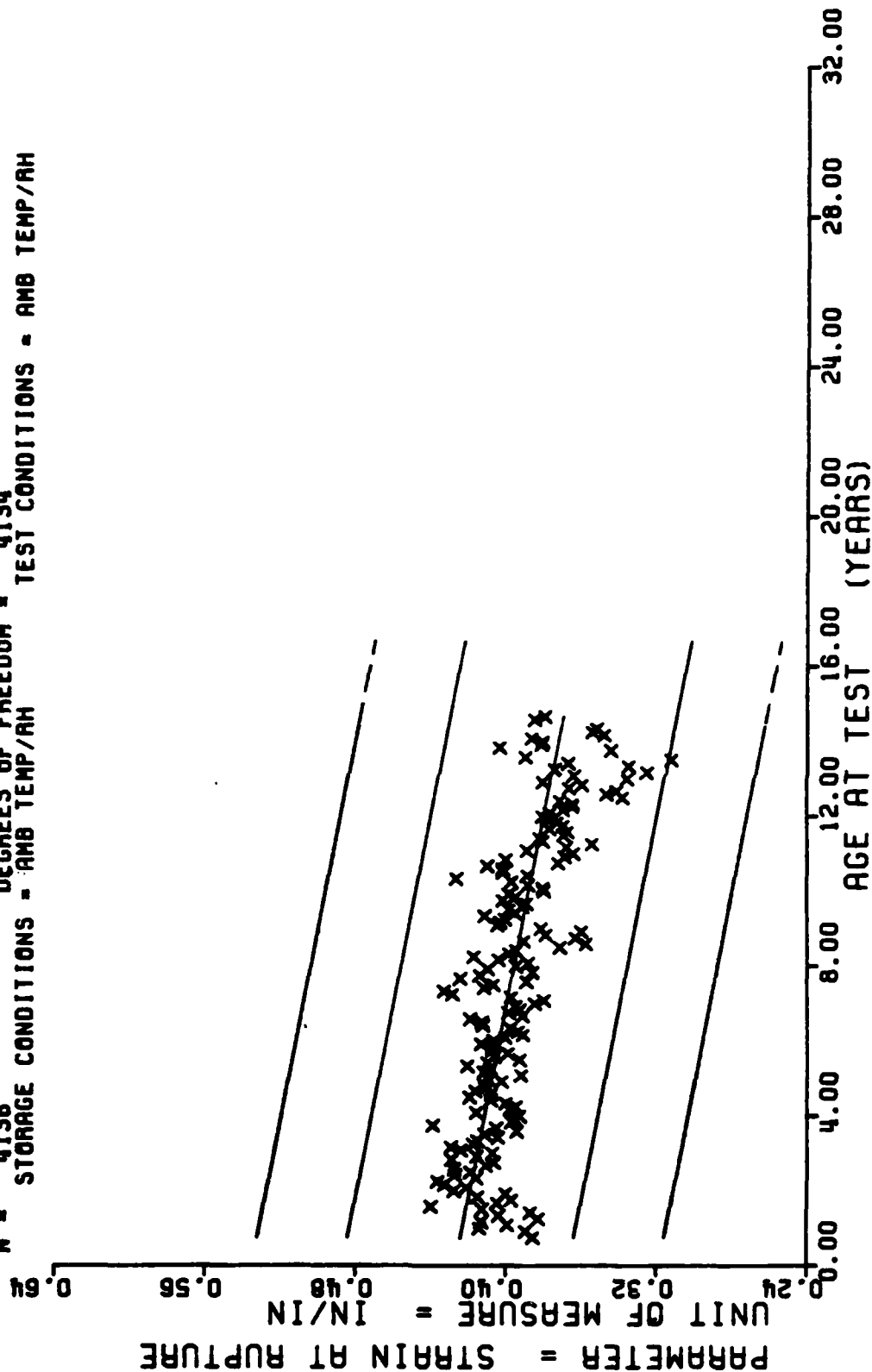
Figure 22



$F = +4.5419625E+02$   
 $R = -3.1463047E-01$   
 $t = +2.1311880E+01$   
 $N = 4136$

$Y = (( +4.2693728E-01 ) + ( -3.2575153E-04 ) \times X)$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF t = SIGNIFICANT  
 DEGREES OF FREEDOM = 4134

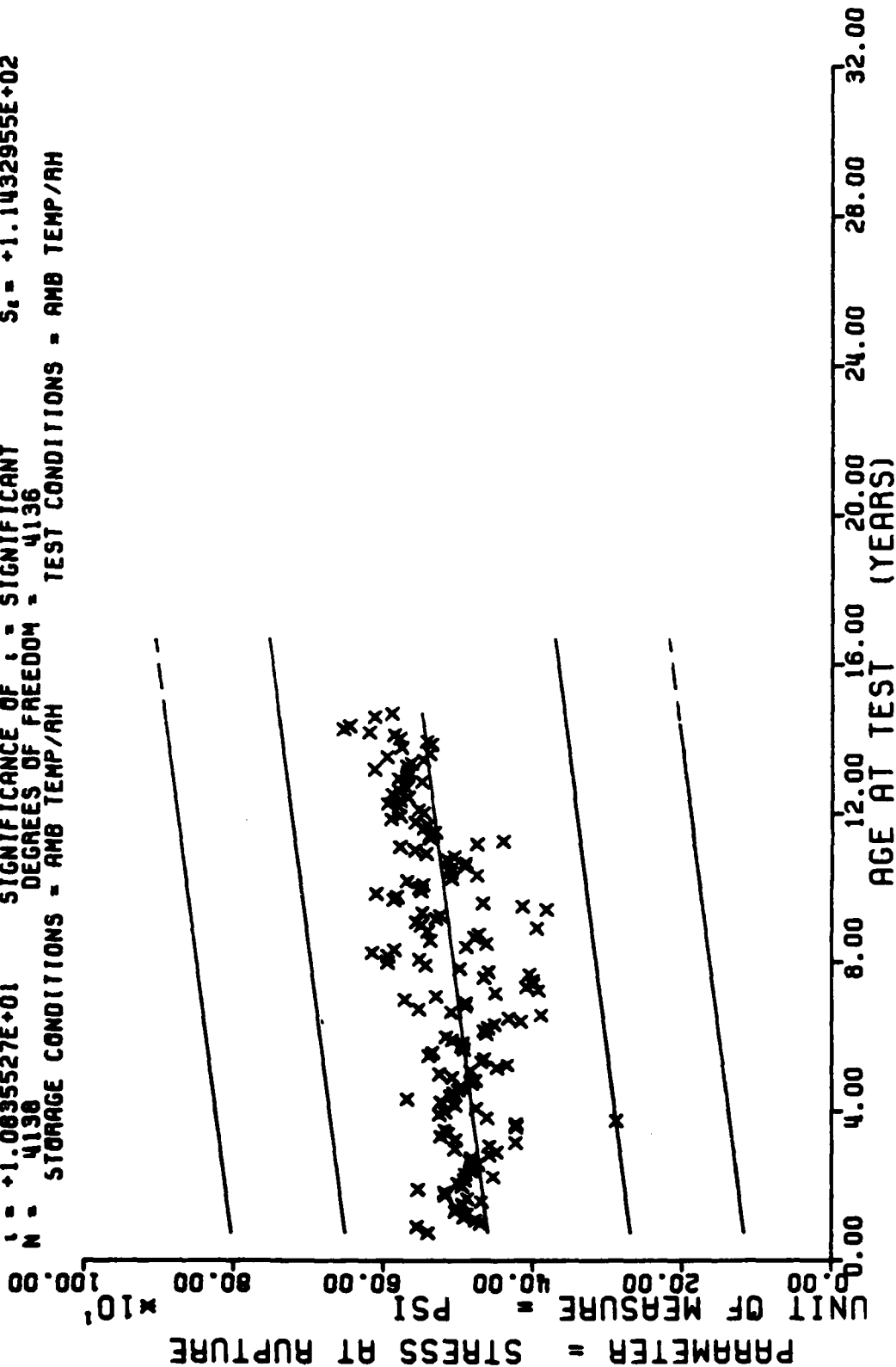
STORAGE CONDITIONS = AMB TEMP/AH      TEST CONDITIONS = AMB TEMP/AH  
 $\sigma_f = +3.7951565E-02$   
 $S_e = +1.5284974E-05$   
 $S_t = +3.6028522E-02$



WING 6, H.A. HYDROSTATIC STRAIN AT RUPTURE, 1750 IN/MIN, 800 PSI

Figure 23

$Y = (1 + 4.5560082E+02) + (5.2594267E-01) \times X$   
 $F = +1.1740864E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma = +1.1592892E+02$   
 $R = +1.6614278E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +4.8483369E-02$   
 $t = +1.0635527E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_e = +1.1432955E+02$   
 $N = 4136$  DEGREES OF FREEDOM = 4136  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



WING 6.H.R.HYDROSTATIC STRESS AT RUPTURE, 1750IN/MIN, 800 PSI

Figure 24

$Y = ((+3.3606565E+03) + (+3.6345843E+00) \times X)$   
 $F = +3.8637002E+01$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = +9.6461842E-02$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +6.2319405E+00$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 4137$  DEGREES OF FREEDOM = 4135  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH

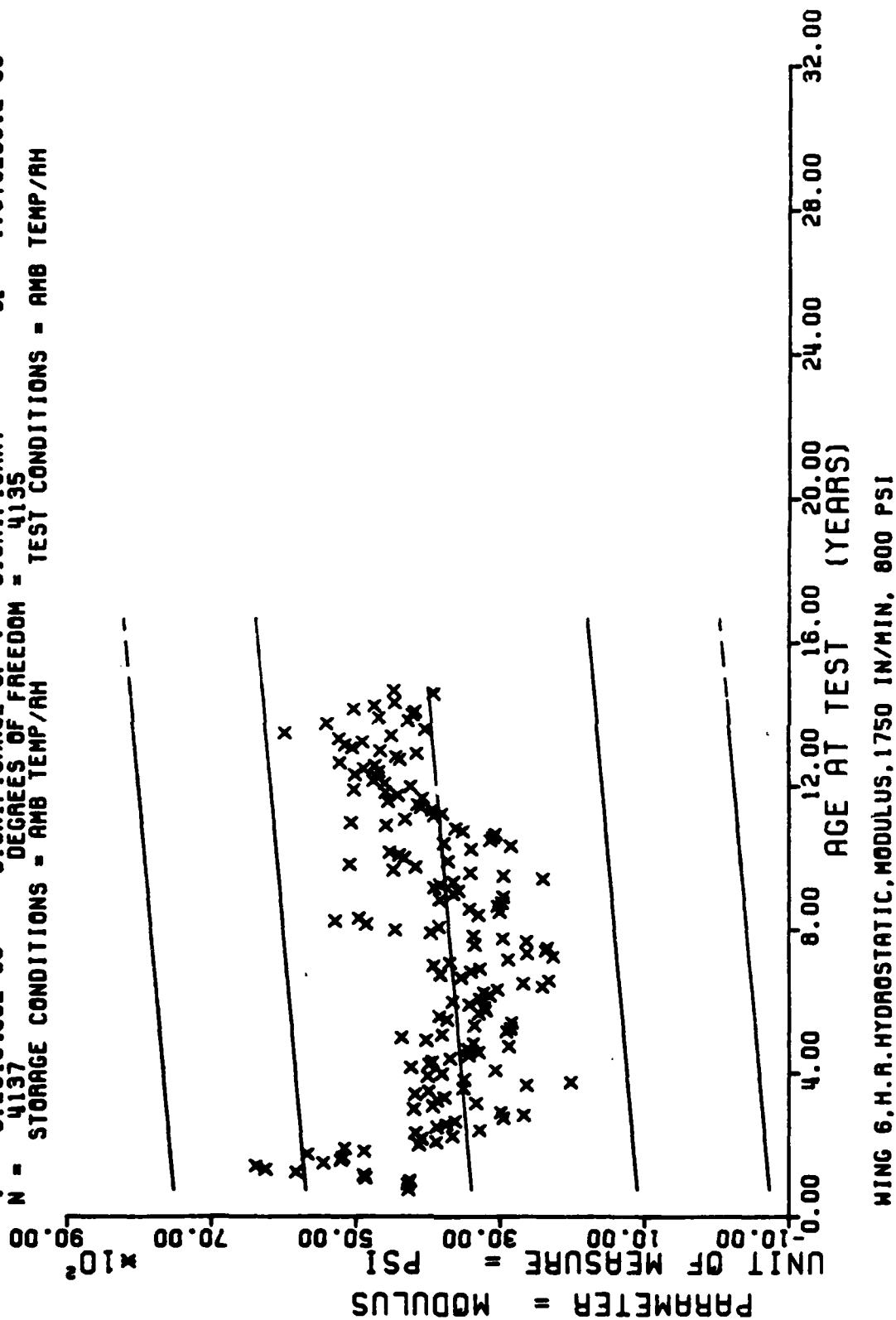


Figure 25

\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (HRS)	NP SAMP
26	13
31	12
36	11
56	5
57	13
59	14
65	12
91	7
94	14
120	12
121	12

1 44 1

STAGE I WING 6 TP-H1011 TLAR ENERGY TEST/TEMP=77 DEG F

This sample size summary is applicable to figure 26

$Y = ((+1.2718053E+00) + (-2.9404E-03) \times X)$   
 $F = +7.3959993E+00$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = -2.9815861E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +2.7195586E+00$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 125$  DEGREES OF FREEDOM = 123  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = 77 DEG/F AMB-AH

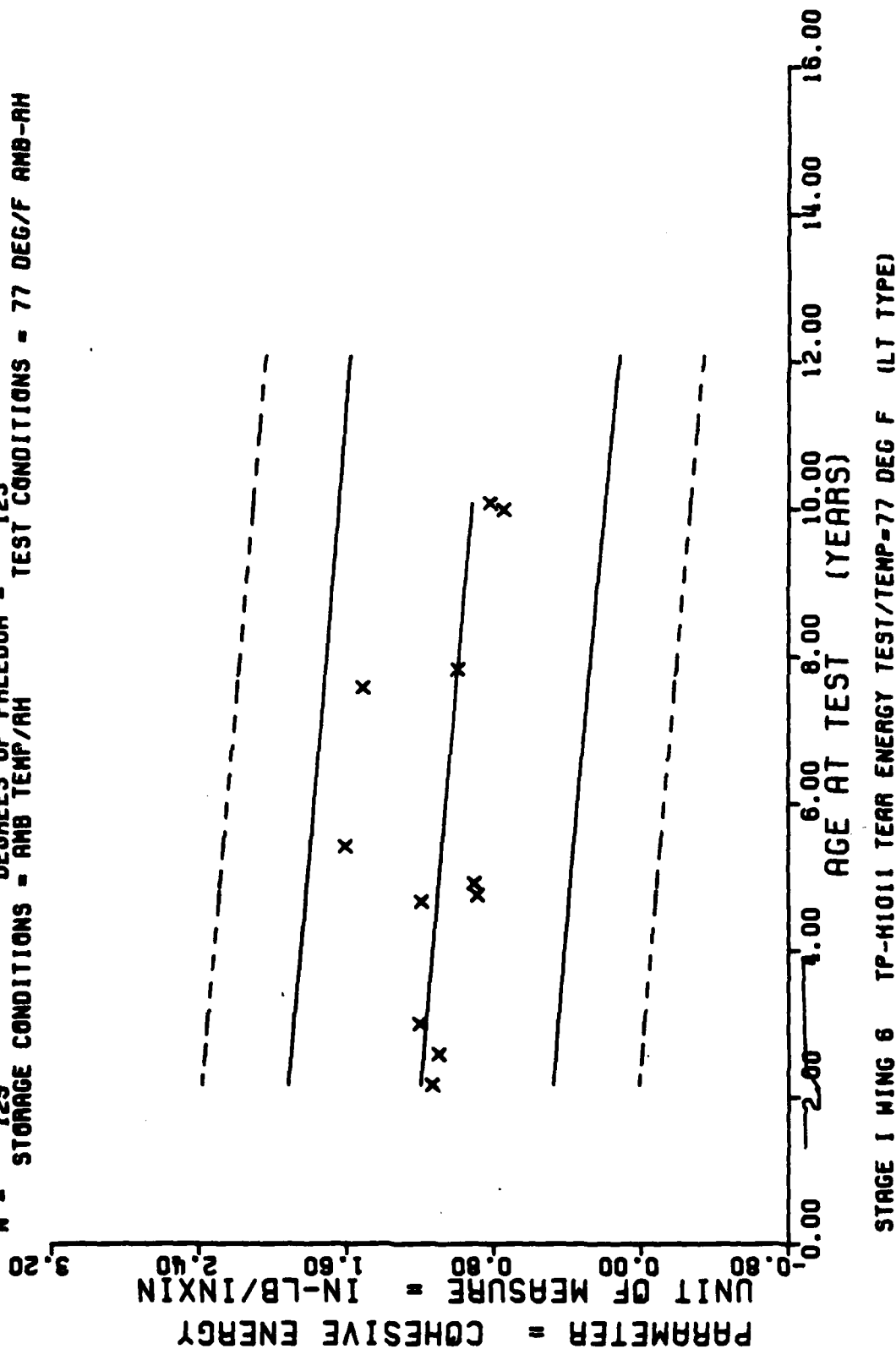


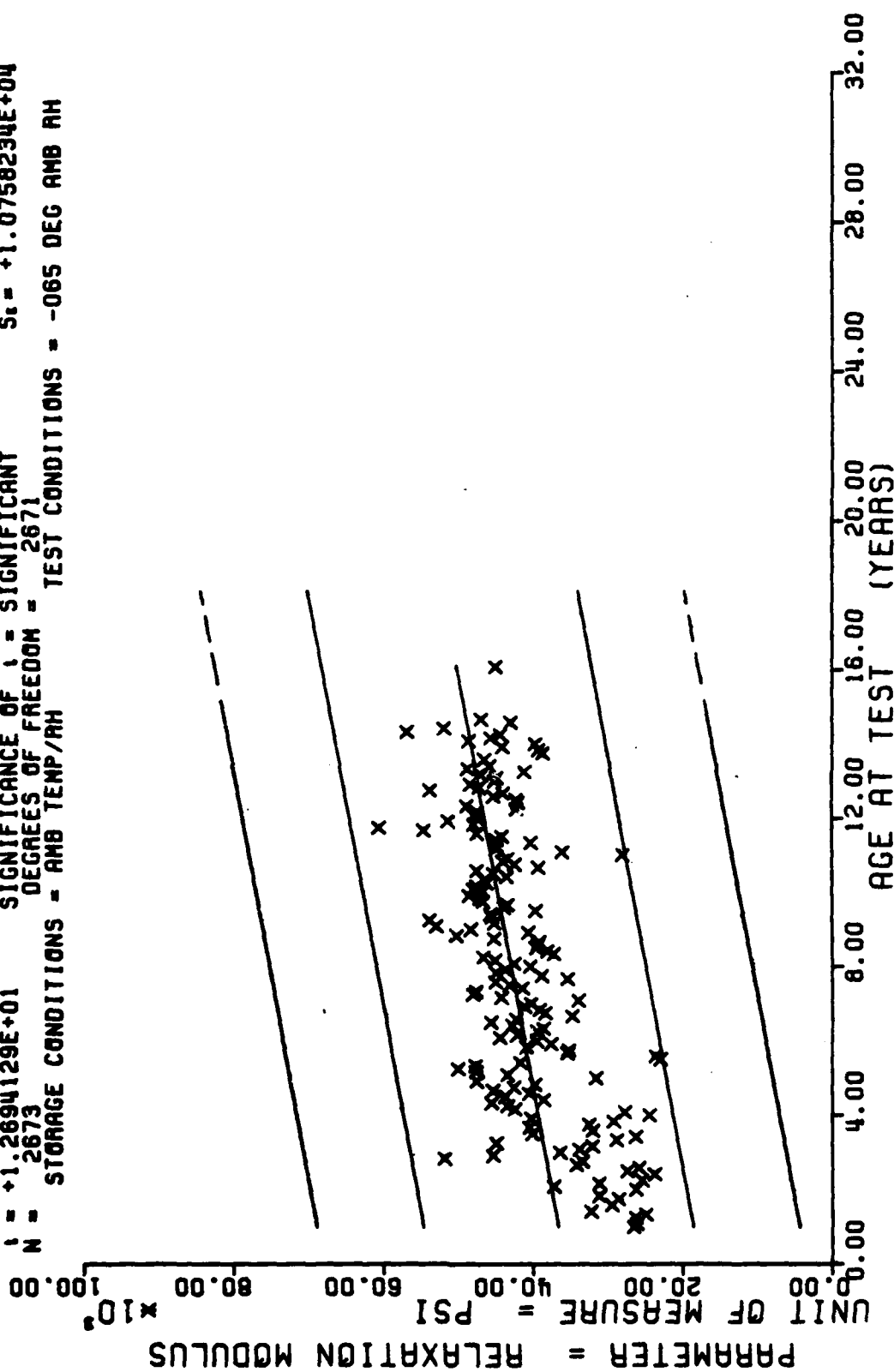
Figure 26

[illegible]

FWING C, STRESS RELAXATION MODULUS, 0.5% STRAIN, 10 SEC, -65 DEG F, YPH-1011

This sample size summary is applicable to figures 27 and 28

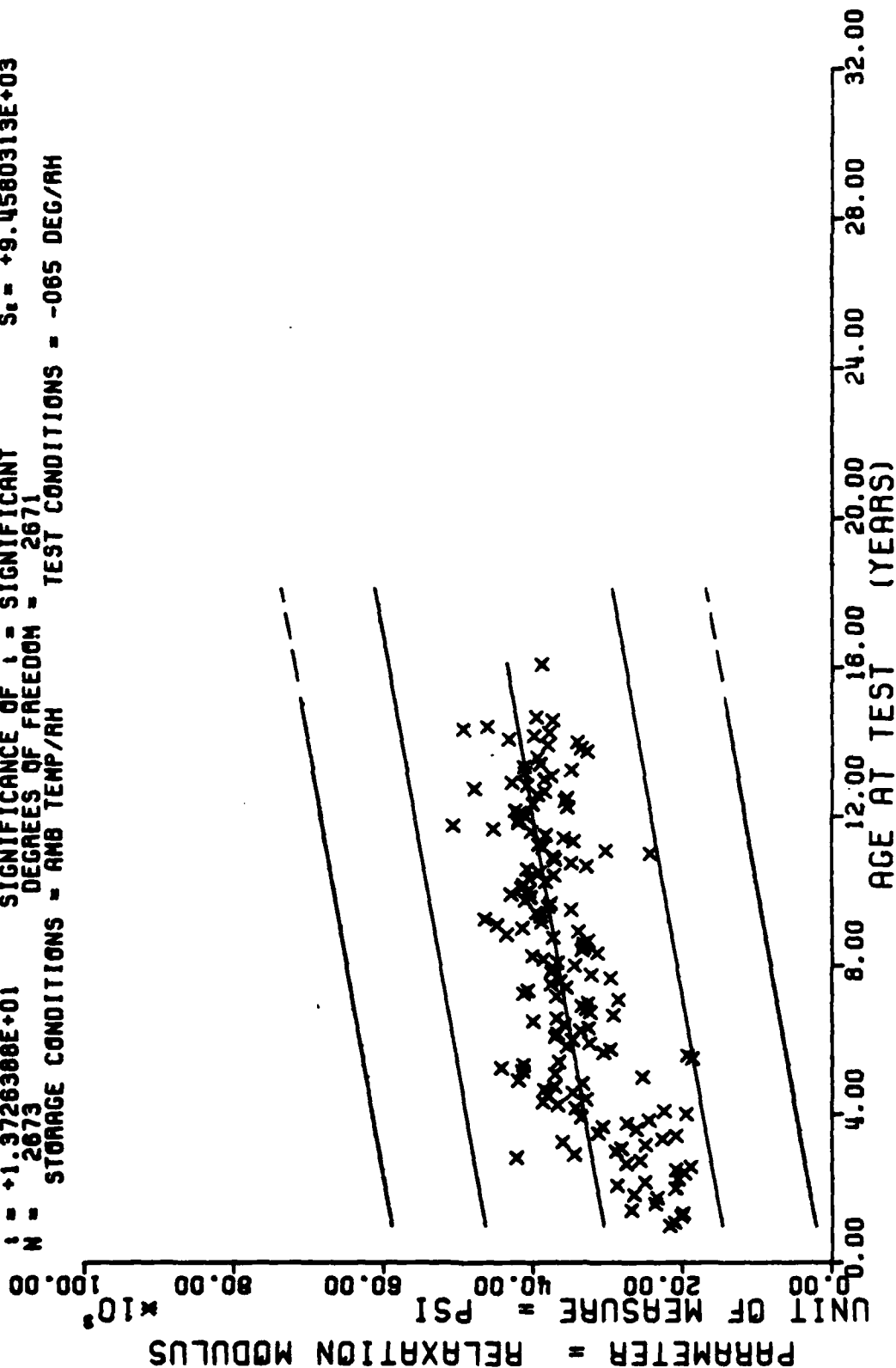
$Y = ((+3.5709074E+04) + (+7.5220504E+01) \times X)$   
 $F = +1.8114093E+02$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = +2.3853137E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +1.2694129E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 2673$  DEGREES OF FREEDOM = 2671  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = -065 DEG AMB RH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 10 SEC, -65 DEG F, TPH-1011

Figure 27

$Y = ((+2.9688180E+04) + (+7.1507124E+01) \times X)$   
 $F = +1.8841379E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $S_1 = +9.7841030E+03$   
 $R = +2.5669521E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_2 = +5.2094640E+00$   
 $t = +1.9726388E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_3 = +9.4580313E+03$   
 $N = 2673$  DEGREES OF FREEDOM = 2671  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = -065 DEG/AH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 50 SEC, -65 DEG F, TPH-1011

Figure 28

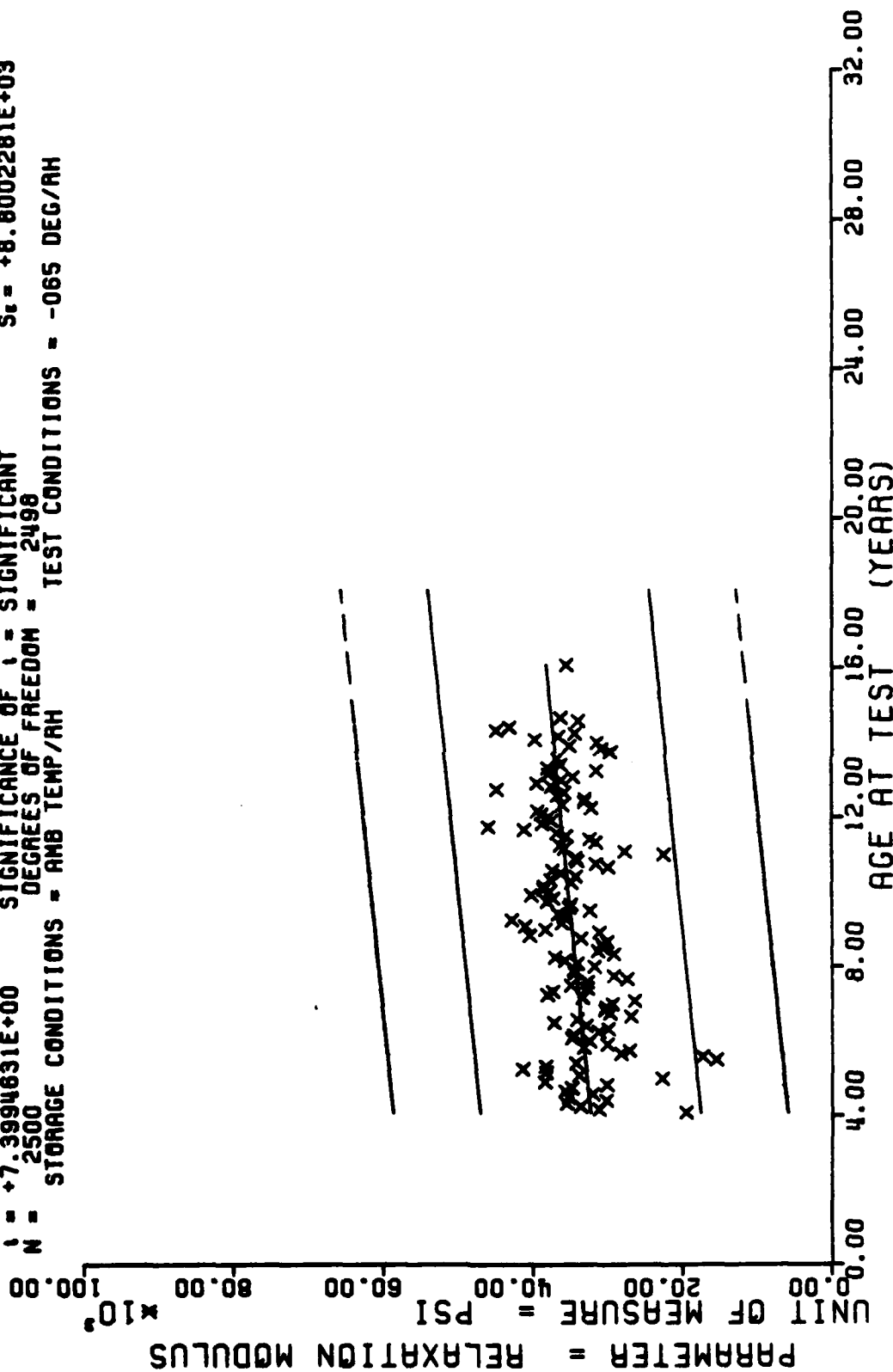


[illegible]

YIELDING STRESS RELAXATION MODULUS, 0.5% STRAIN, 100 SEC., -65 DEG F, TPH-1011

This sample size summary is applicable to figures 29 and 30

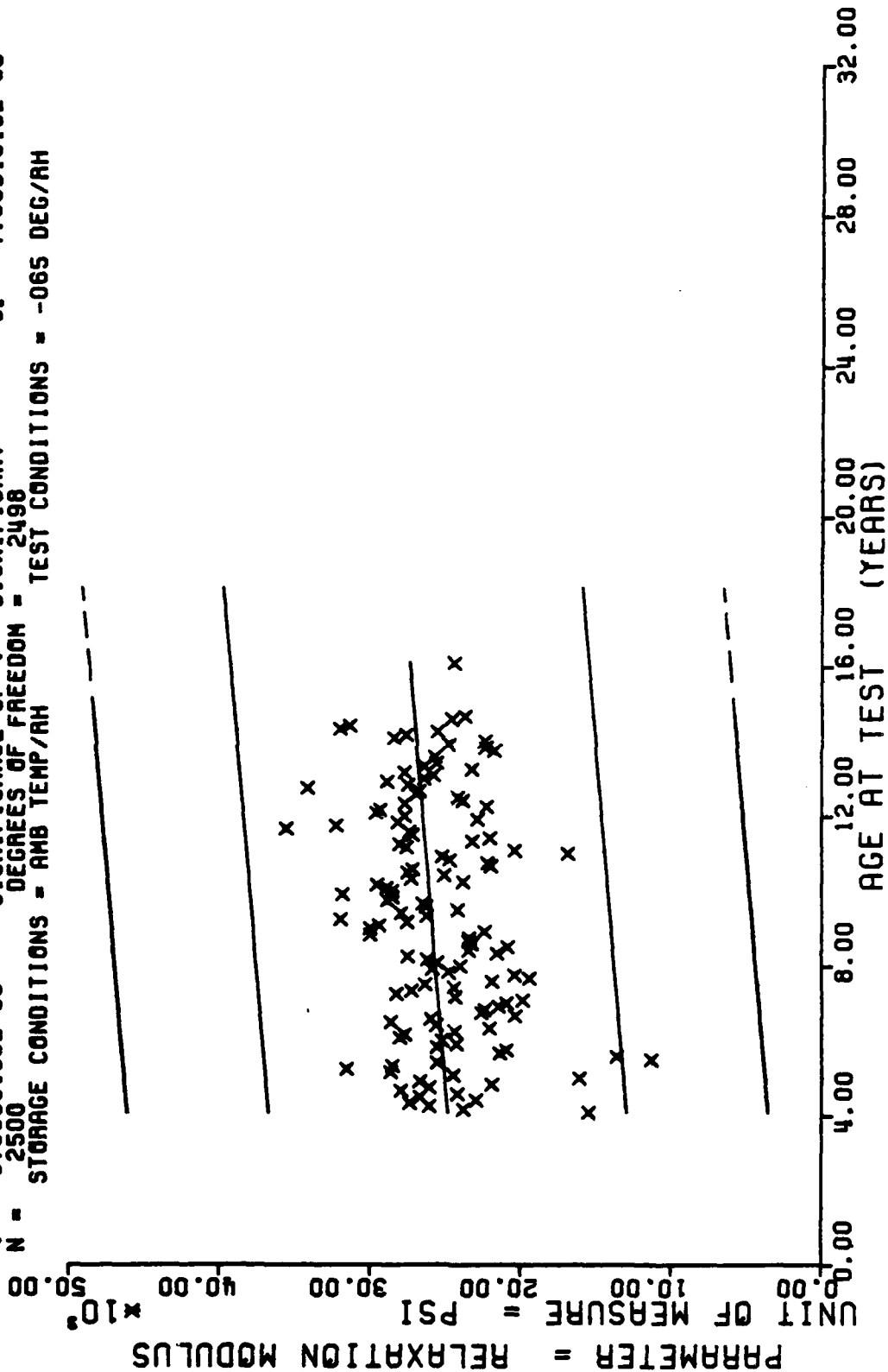
$Y = ((+3.0305795E+04) + (+4.0847918E+01) \cdot X)$   
 $F = +5.4752055E+01$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma_f = +8.8943685E+03$   
 $R = +1.4645219E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +5.5203894E+00$   
 $t = +7.3994631E+00$  SIGNIFICANCE OF t = SIGNIFICANT  $S_e = +8.8002281E+03$   
 $N = 2500$  DEGREES OF FREEDOM = 2498  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = -065 DEG/AH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 100 SEC. -65 DEG F, TPH-1011

Figure 29

$Y = ((+2.3973574E+04) + (+1.7658525E+01) \cdot X)$   
 $F = +1.5738446E+01$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = +7.9121308E-02$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +3.9669189E+00$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 2500$  DEGREES OF FREEDOM = 2498  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -065 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 1000 SEC, -65 DEG F, TPH-1011

Figure 30

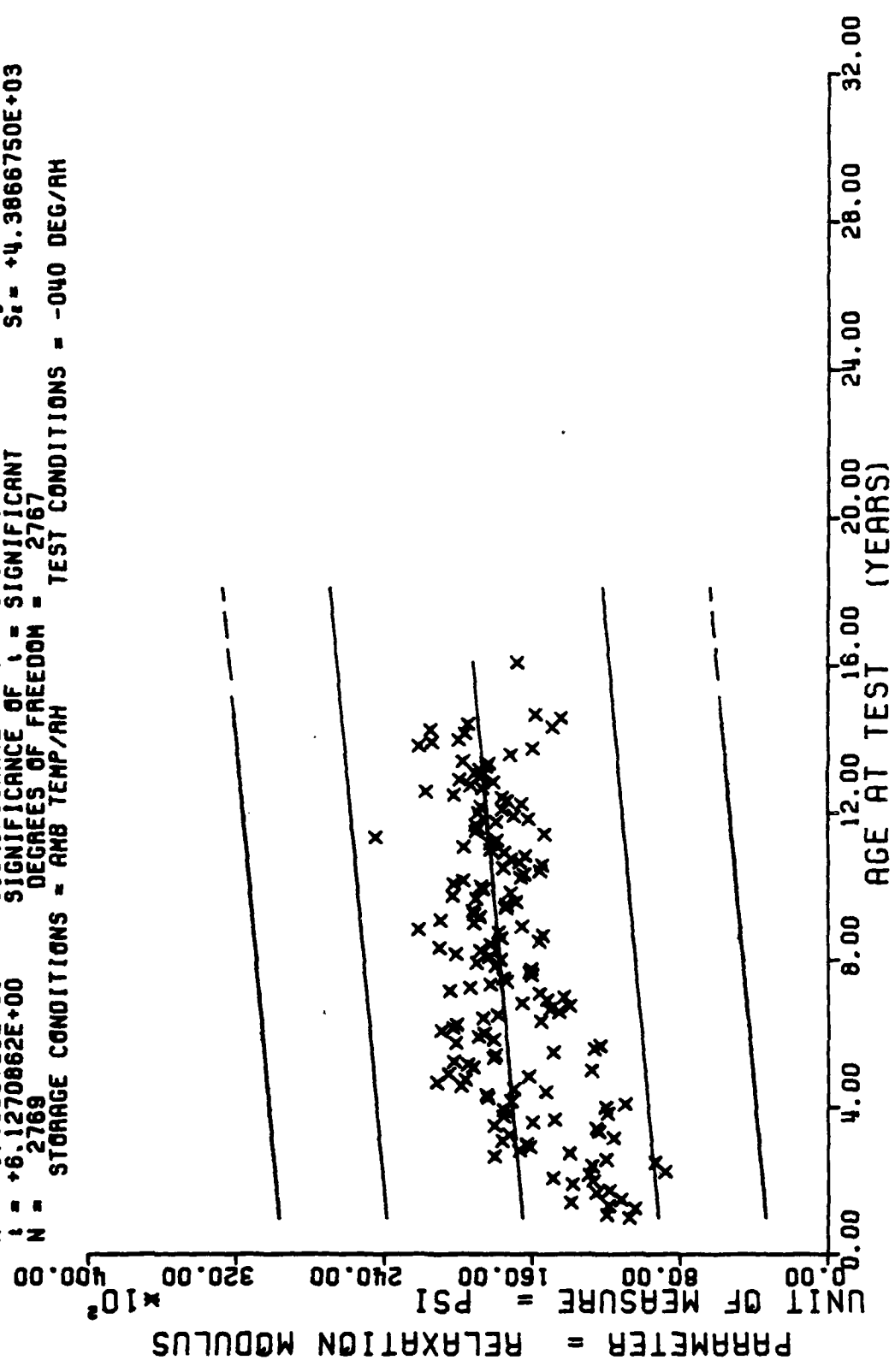
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
12	3	41	2	66	6	51	18	116	49	141	15	141	15
13	3	42	9	67	6	92	24	117	21	142	30	142	30
15	3	43	9	68	12	93	18	118	21	143	40	143	40
16	3	44	3	69	21	94	22	119	15	144	9	144	9
17	7	45	6	70	30	95	21	120	32	145	6	145	6
18	3	46	3	71	44	96	57	121	21	146	3	146	3
20	3	47	9	72	36	97	68	122	6	147	12	147	12
21	6	48	3	73	35	98	54	123	11	148	3	148	3
23	3	49	6	74	34	99	42	124	16	149	12	149	12
24	2	50	27	75	28	100	21	125	16	150	3	150	3
25	6	51	51	76	29	101	24	126	19	151	15	151	15
26	7	52	47	77	36	102	6	127	47	152	6	152	6
27	2	53	14	78	35	103	21	128	20	153	6	153	6
29	8	54	30	79	15	104	15	129	1	154	9	154	9
30	3	55	18	80	19	105	5	130	33	155	6	155	6
31	6	56	12	81	24	106	3	131	51	156	9	156	9
32	3	57	27	82	33	107	9	132	9	157	9	157	9
33	6	58	19	83	9	108	18	133	15	158	6	158	6
34	6	59	9	84	24	109	12	134	43	159	6	159	6
35	3	60	12	85	21	110	9	135	15	160	9	160	9
36	18	61	20	86	15	111	6	136	3	161	15	161	15
37	5	62	48	87	30	112	21	137	18	163	3	163	3
38	5	63	24	88	23	113	59	138	41	165	3	165	3
39	6	64	24	89	21	114	37	139	51	166	6	166	6
40	12	65	5	90	29	115	60	140	9	167	6	167	6
										168	3	168	3
										171	3	171	3
										193	3	193	3

WING 6. STRESS RELAXATION MODULUS, 0.5% STRAIN, 10 SEC. - 40 DEG F. YPH-1011

This sample size summary is applicable to figures 31 thru 34

$F = +3.7541185E+01$  SIGNIFICANCE OF F = (+1.4697235E+01) \* X)  
 $R = +1.1569726E-01$  SIGNIFICANT  
 $t = +6.1270862E+00$  SIGNIFICANT  
 $N = 2769$  DEGREES OF FREEDOM = 2767  
 STORAGE CONDITIONS = AMB TEMP/AM TEST CONDITIONS = -040 DEG/AM

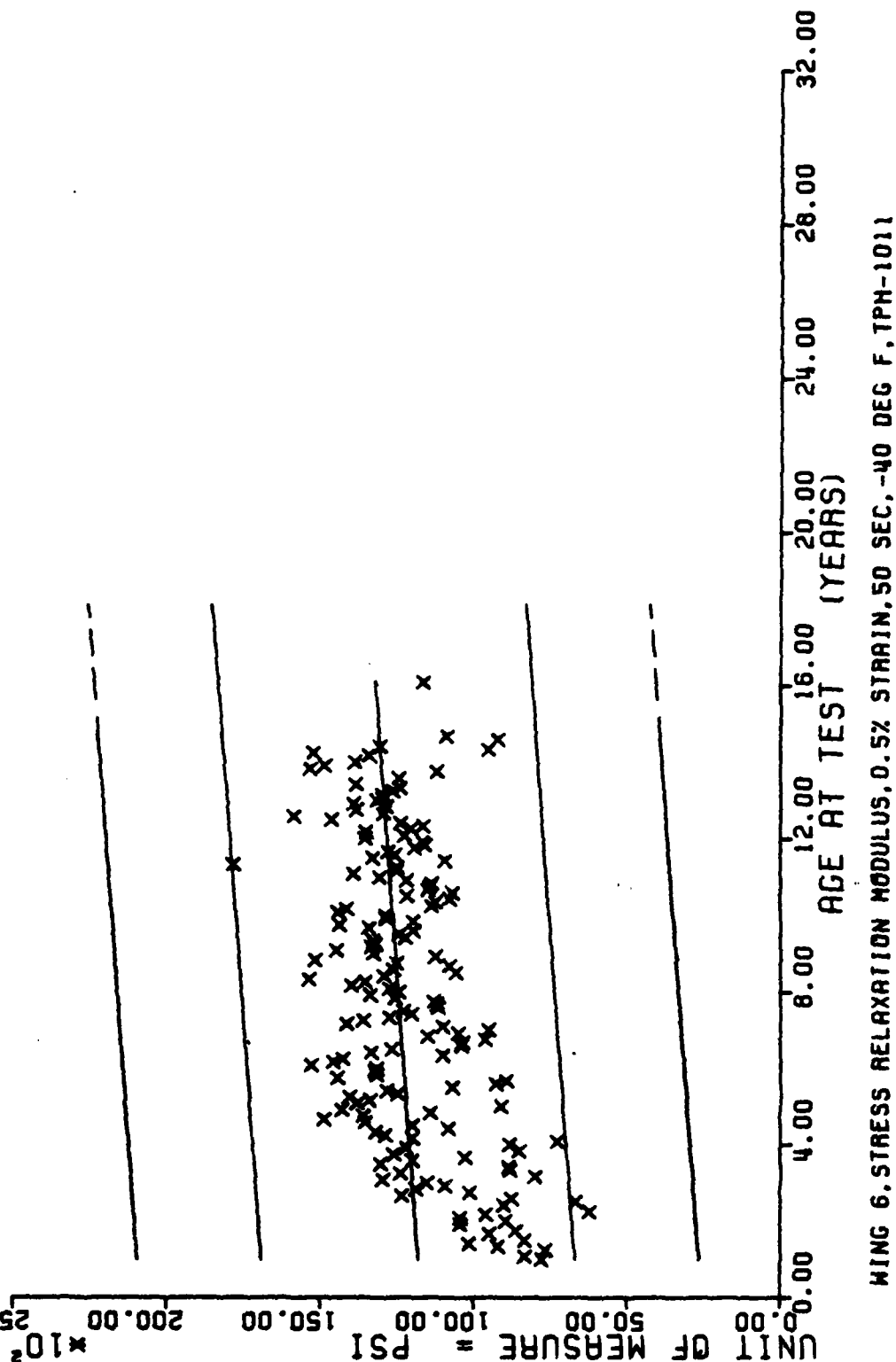


WING 6. STRESS RELAXATION MODULUS, 0.5% STRAIN, 10 SEC, -40 DEG F, TPH-1011

Figure 31

$Y = ((+1.1702018E+04) + (+7.7770291E+00) \times X)$   
 $F = +2.1773650E-01$  SIGNIFICANCE OF F = SIGNIFICANT  $Q = +3.0593240E+03$   
 $R = +8.8360667E-02$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +1.8686841E+00$   
 $I = +4.6662244E+00$  SIGNIFICANCE OF I = SIGNIFICANT  $S_c = +3.0479082E+03$   
 $N = 2769$  DEGREES OF FREEDOM = 2767  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = -040 DEG/AH

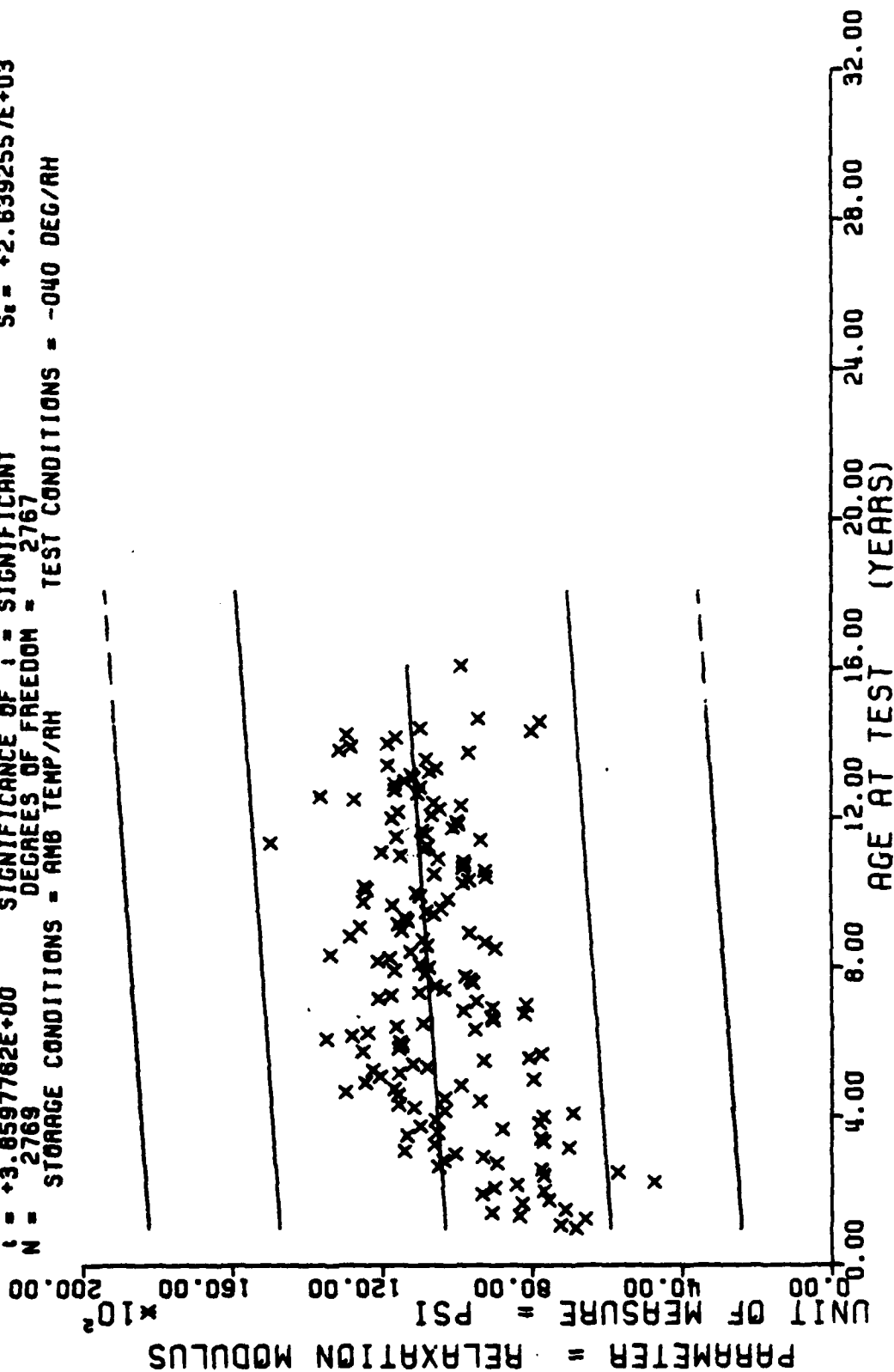
PARAMETER = RELAXATION MODULUS  
 UNIT OF MEASURE = PSI  
 $\times 10^2$



WING 6. STRESS RELAXATION MODULUS, 0.5% STRAIN, 50 SEC, -40 DEG F, TPN-1011

Figure 32

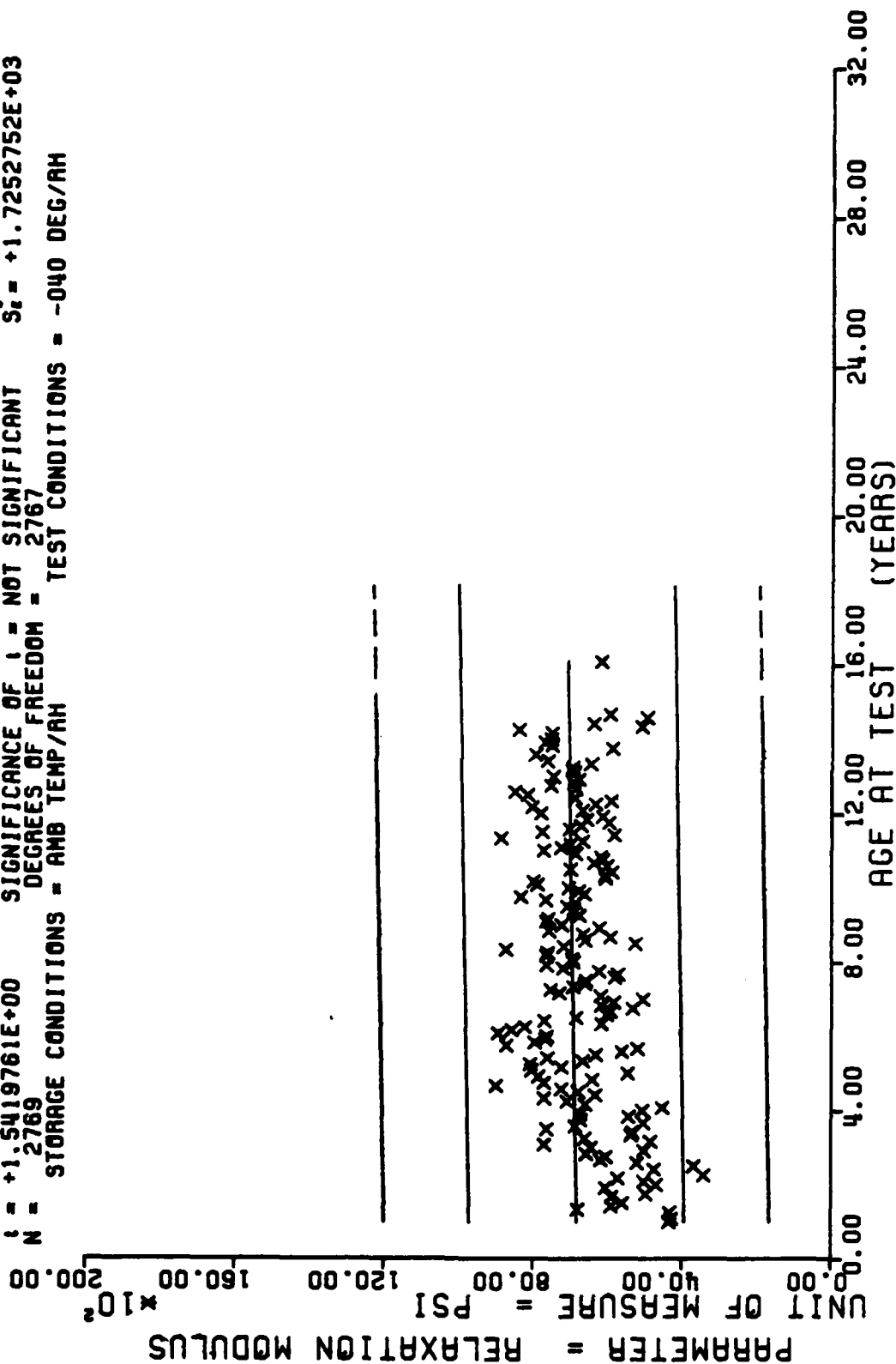
$Y = ((+1.0259006E+04) + (+5.5704440E+00) \cdot X)$   
 $F = +1.4897872E+01$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = +7.3179853E-02$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +3.8597762E+00$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 2769$  DEGREES OF FREEDOM = 2767  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -040 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 100 SEC, -40 DEG F, TPH-1011

Figure 33

$Y = ((+6.8024457E+03) + (+1.4547294E+00) \cdot X)$   
 $F = +2.3776904E+00$  SIGNIFICANCE OF F = NOT SIGNIFICANT  $\alpha = +1.7257045E+03$   
 $R = +2.9301277E-02$  SIGNIFICANCE OF R = NOT SIGNIFICANT  $S_0 = +9.4341893E-01$   
 $t = +1.5419761E+00$  SIGNIFICANCE OF t = NOT SIGNIFICANT  $S_1 = +1.7252752E+03$   
 $N = 2769$  DEGREES OF FREEDOM = 2767  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = -040 DEG/AH



WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 1000 SEC, -40 DEG F, TPH-1011

Figure 34



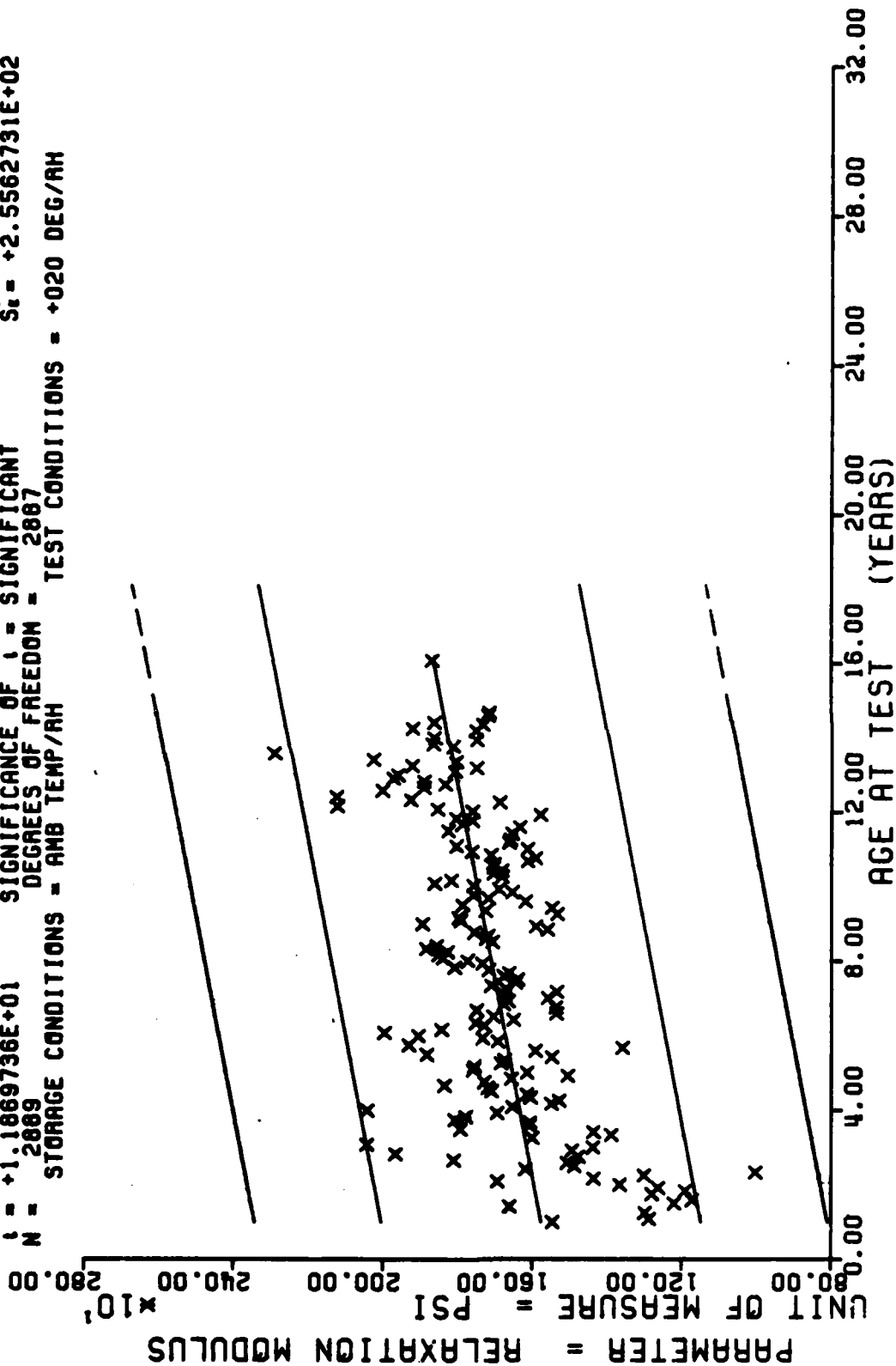
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
12	3	41	3	66	9	91	21	116	51	142	30	142	30
13	3	42	15	67	10	92	21	117	21	143	26	143	26
15	6	43	9	68	9	93	21	118	21	144	12	144	12
17	7	44	3	69	29	94	21	119	27	145	6	145	6
18	3	45	6	70	24	95	32	120	33	146	6	146	6
19	9	46	6	71	46	96	57	121	21	147	12	147	12
21	9	47	9	72	42	97	57	122	9	148	3	148	3
22	6	48	3	73	24	98	54	123	12	149	12	149	12
23	6	49	6	74	39	99	42	124	23	151	15	151	15
24	6	50	27	75	38	100	21	125	18	152	9	152	9
25	6	51	59	76	26	101	27	126	20	153	6	153	6
26	6	52	46	77	37	102	11	127	17	154	9	154	9
27	6	53	15	78	36	103	21	128	24	155	9	155	9
28	3	54	32	79	18	104	9	129	3	156	9	156	9
29	9	55	18	80	24	105	9	130	33	157	9	157	9
30	3	56	18	81	39	106	9	131	54	158	6	158	6
31	9	57	30	82	27	107	15	132	15	159	6	159	6
32	3	58	16	83	15	108	18	133	9	160	9	160	9
33	12	59	6	84	27	109	12	134	42	161	15	161	15
34	9	60	22	85	12	110	12	135	18	163	3	163	3
35	9	61	21	86	21	111	6	137	18	165	3	165	3
36	24	62	49	87	20	112	39	138	29	166	6	166	6
37	9	63	24	88	24	113	53	139	69	167	12	167	12
38	12	64	27	89	24	114	41	140	12	168	6	168	6
40	3	65	12	90	10	115	48	141	12	170	9	170	9
										171	6	171	6
										172	3	172	3
										173	3	173	3
										175	3	175	3
										176	6	176	6
										193	3	193	3
										226	3	226	3

WING STIFFNESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC. 20 DEG F, TPN-1011

This sample size summary is applicable to figures 35 thru 38

$Y = ((+1.5569620E+03) + (+1.5958848E+00) \times X)$   
 $F = +1.4089063E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma_f = +2.6174521E+02$   
 $R = +2.1571034E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +1.3444990E-01$   
 $t = +1.1869736E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_t = +2.5562731E+02$   
 $N = 2889$  DEGREES OF FREEDOM = 2887  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = +020 DEG/AH



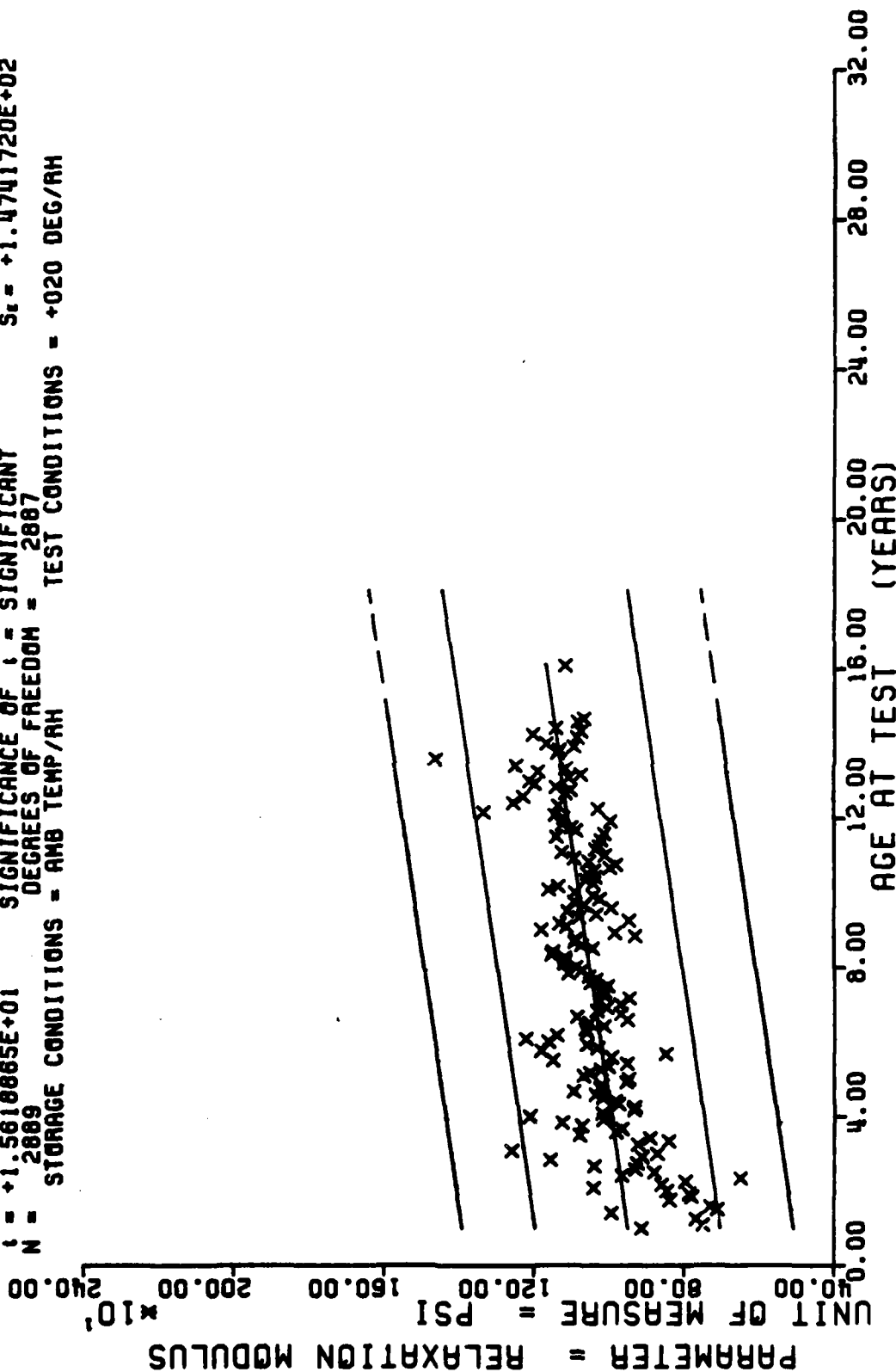
WING 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 20 DEG F, TPH-1011

Figure 35

$F = +2.4394897E+02$   
 $R = +2.7913320E-01$   
 $t = +1.5618865E+01$   
 $N = 2889$

$Y = ((+9.3569020E+02) + (+1.2110188E+00) \times X)$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF t = SIGNIFICANT  
 DEGREES OF FREEDOM = 2887

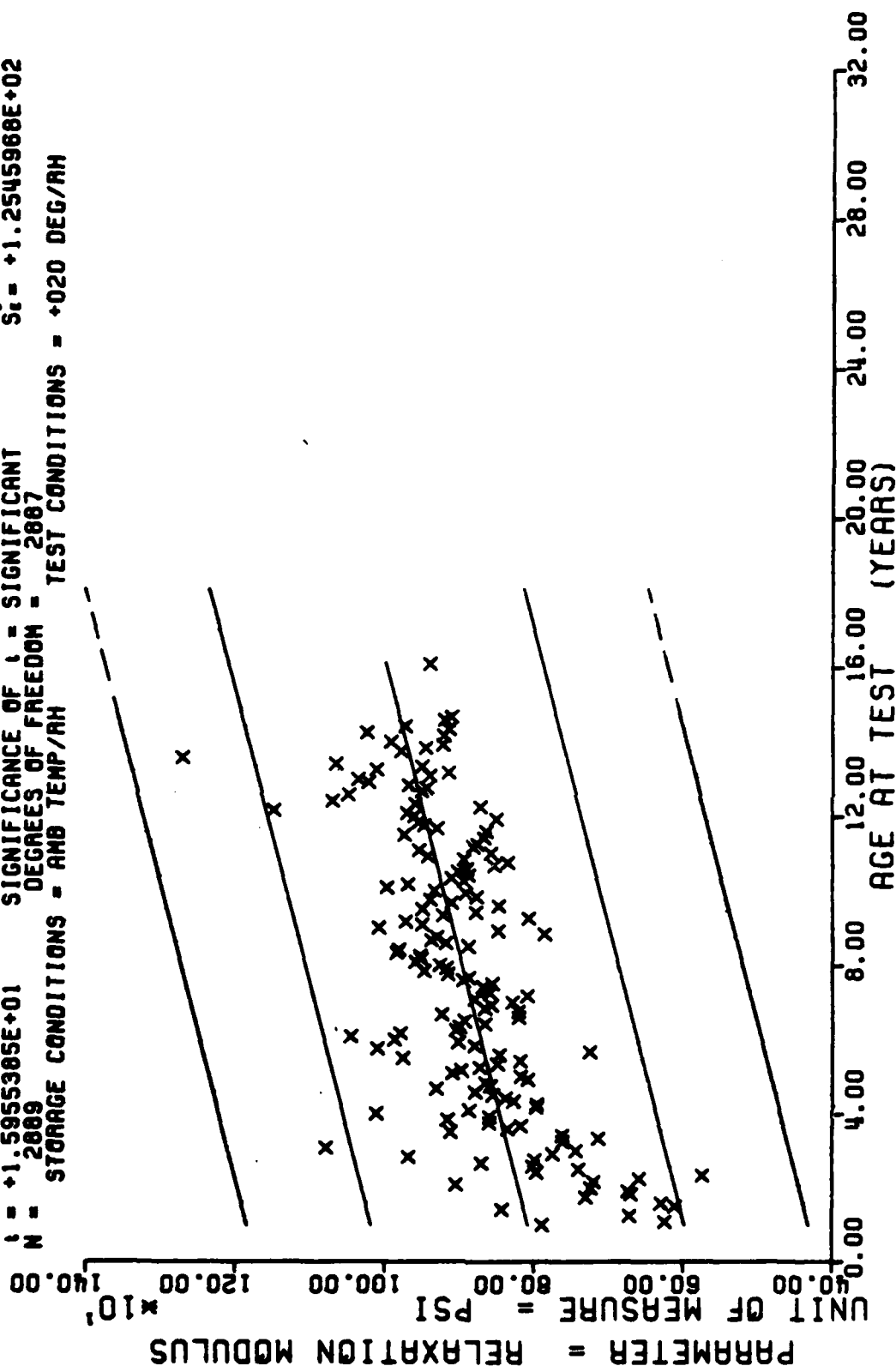
STORAGE CONDITIONS = AMB TEMP/RH  
 TEST CONDITIONS = +020 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC, 20 DEG F, TPH-1011

Figure 36

$F = +2.5457493E+02$   
 $R = +2.8486471E-01$   
 $t = +1.5955385E+01$   
 $N = 2889$   
 $Y = ((+7.9507818E+02) + (+1.0528457E+00) * X)$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF t = SIGNIFICANT  
 DEGREES OF FREEDOM = 2887  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +020 DEG/RH  
 $\sigma = +1.3085167E+02$   
 $S_o = +6.5986856E-02$   
 $S_e = +1.2545968E+02$



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC. 20 DEG F, TPH-1011

Figure 37

$Y = ((+5.3405875E+02) + (+5.0560564E-01) \times X)$   
 $F = +1.2023064E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma_f = +8.9461436E+01$   
 $R = +1.9995129E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +4.6110977E-02$   
 $t = +1.0964973E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_e = +8.7670017E+01$   
 $N = 2889$  DEGREES OF FREEDOM = 2887  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = +020 DEG/AH

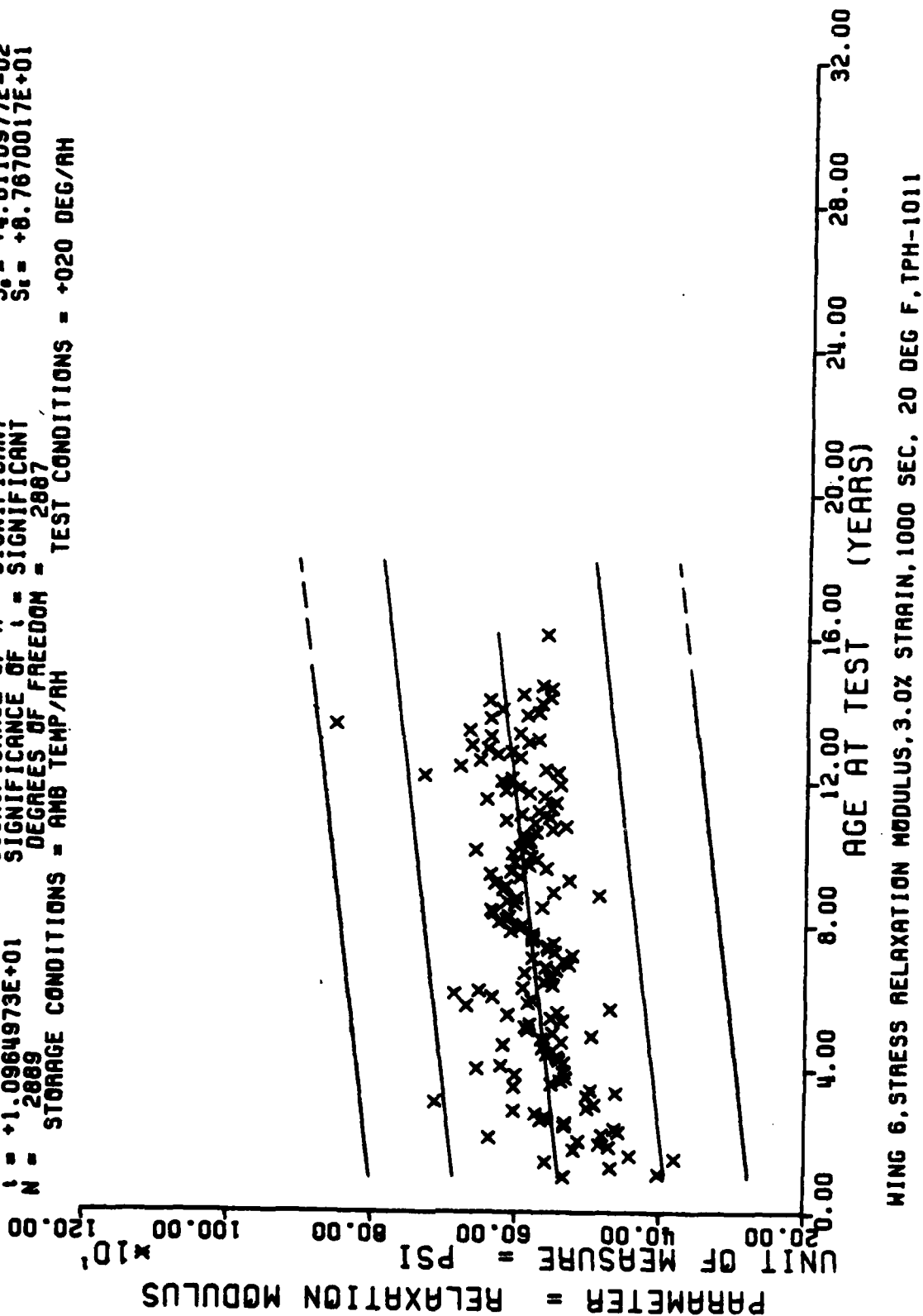


Figure 38

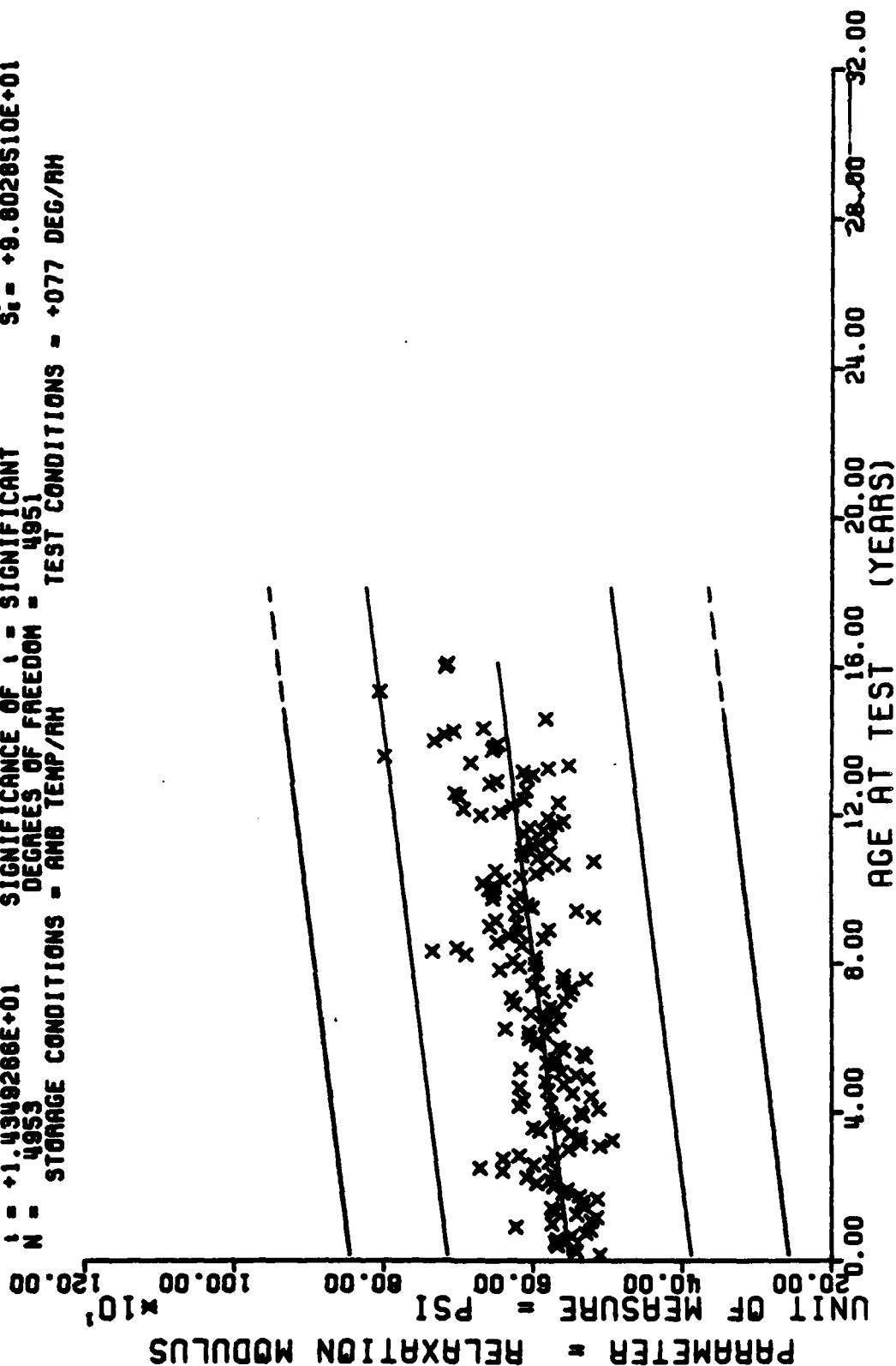
AGE (MOS)	NR SAMP	AGE (MUS)	NP SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MOS)	NR SAMP
2	3	27	24	52	72	77	33	102	15	127	18
3	6	28	27	53	18	78	39	103	26	128	24
4	14	29	48	54	39	79	21	104	12	129	3
5	22	30	43	55	22	80	21	105	6	130	42
6	21	31	30	56	36	81	45	106	3	131	45
7	35	32	60	57	51	82	21	107	10	132	14
8	30	33	29	58	45	83	15	108	24	133	12
9	45	34	51	59	39	84	21	109	9	134	39
10	38	35	36	60	74	85	15	110	9	135	15
11	37	36	58	61	66	86	21	111	9	137	18
12	65	37	18	62	82	87	36	112	30	138	45
13	51	38	24	63	63	88	21	113	62	139	48
14	46	39	42	64	51	89	30	114	44	140	15
15	57	40	18	65	36	90	42	115	30	141	12
16	36	41	24	66	39	91	14	116	71	142	27
17	46	42	12	67	36	92	23	117	18	143	33
18	13	43	9	68	51	93	19	118	21	144	6
19	10	44	9	69	75	94	18	119	21	145	6
20	4	45	6	70	99	95	39	120	36	146	6
21	27	46	18	71	62	96	96	121	15	147	12
22	3	47	30	72	66	97	90	122	9	148	3
23	6	48	36	73	51	98	96	123	12	149	6
24	34	49	42	74	66	99	42	124	24	150	6
25	27	50	30	75	45	100	20	125	18	151	15
26	30	51	82	76	27	101	34	126	22	152	3

WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 77 DEG F, TPH-1011

This sample size summary is applicable to figures 39 thru 42

Age	Nr	Age	Nr
154	12	166	6
155	3	167	12
156	9	168	3
157	9	170	3
158	9	171	6
159	3	172	3
160	6	175	3
161	15	184	3
163	3	192	1
165	3	193	2

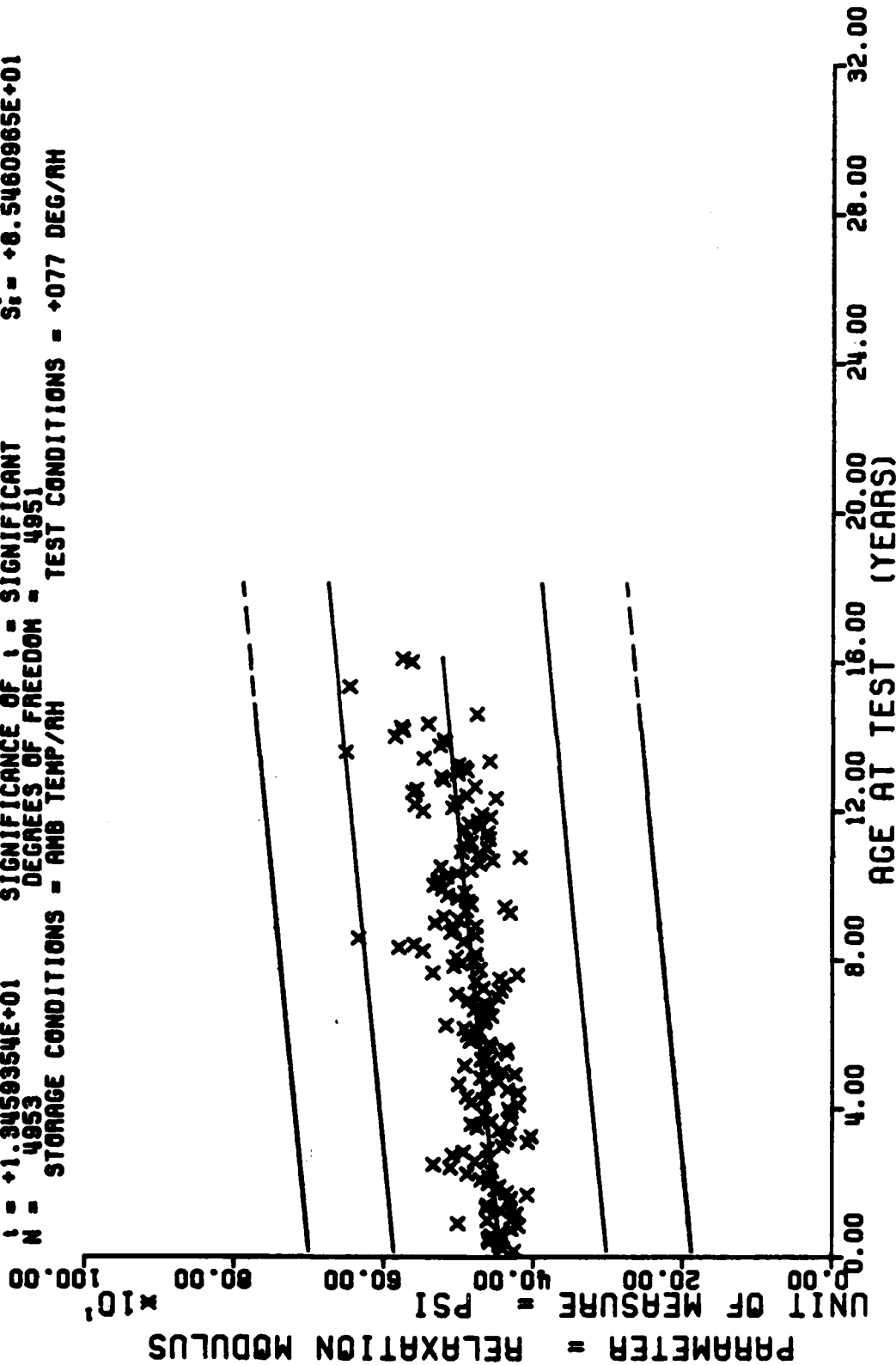
$F = +2.0590143E+02$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = +1.9981830E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +1.4349288E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 4953$  DEGREES OF FREEDOM = 4951  
 STORAGE CONDITIONS = AMB TEMP/AM TEST CONDITIONS = +077 DEG/RH  
 $Y = ((+5.5073378E+02) + (+4.9998100E-01) * X)$   
 $S_y = +1.0003604E+02$   
 $S_x = +3.4843664E-02$   
 $S_{t_1} = +9.8028510E+01$



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 77 DEG F, TPH-1011

Figure 39

$Y = (( +4.438682E+02 ) + ( +4.0884947E-01 ) \cdot X)$   
 $F = +1.0115422E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma = +0.7001817E+01$   
 $R = +1.0707733E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_0 = +3.0378803E-02$   
 $t = +1.3458354E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_t = +0.5460985E+01$   
 $N = 4953$  DEGREES OF FREEDOM = 4951  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +077 DEG/RH

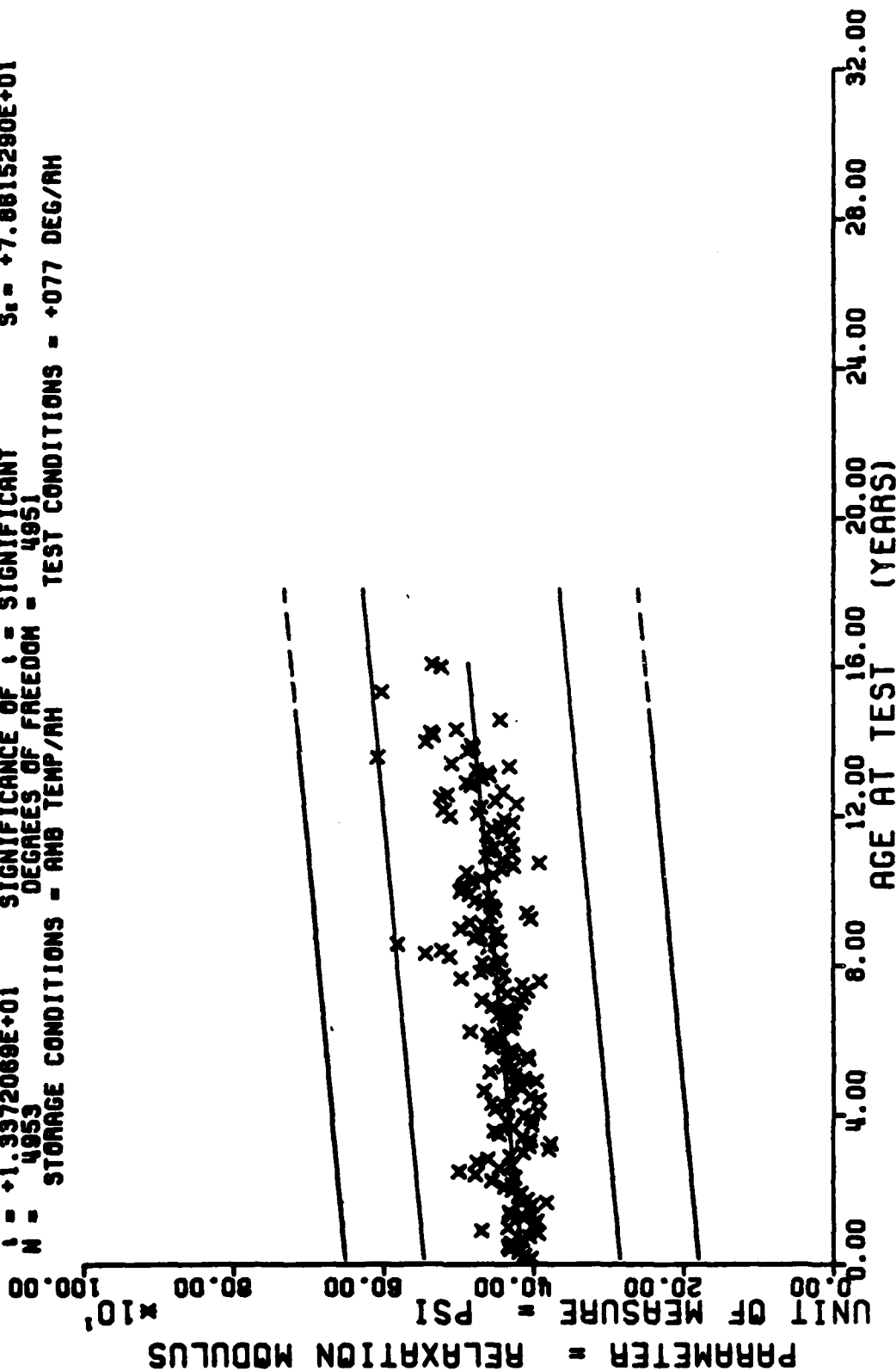


WING 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC. 77 DEG F, TPN-1011

Figure 40



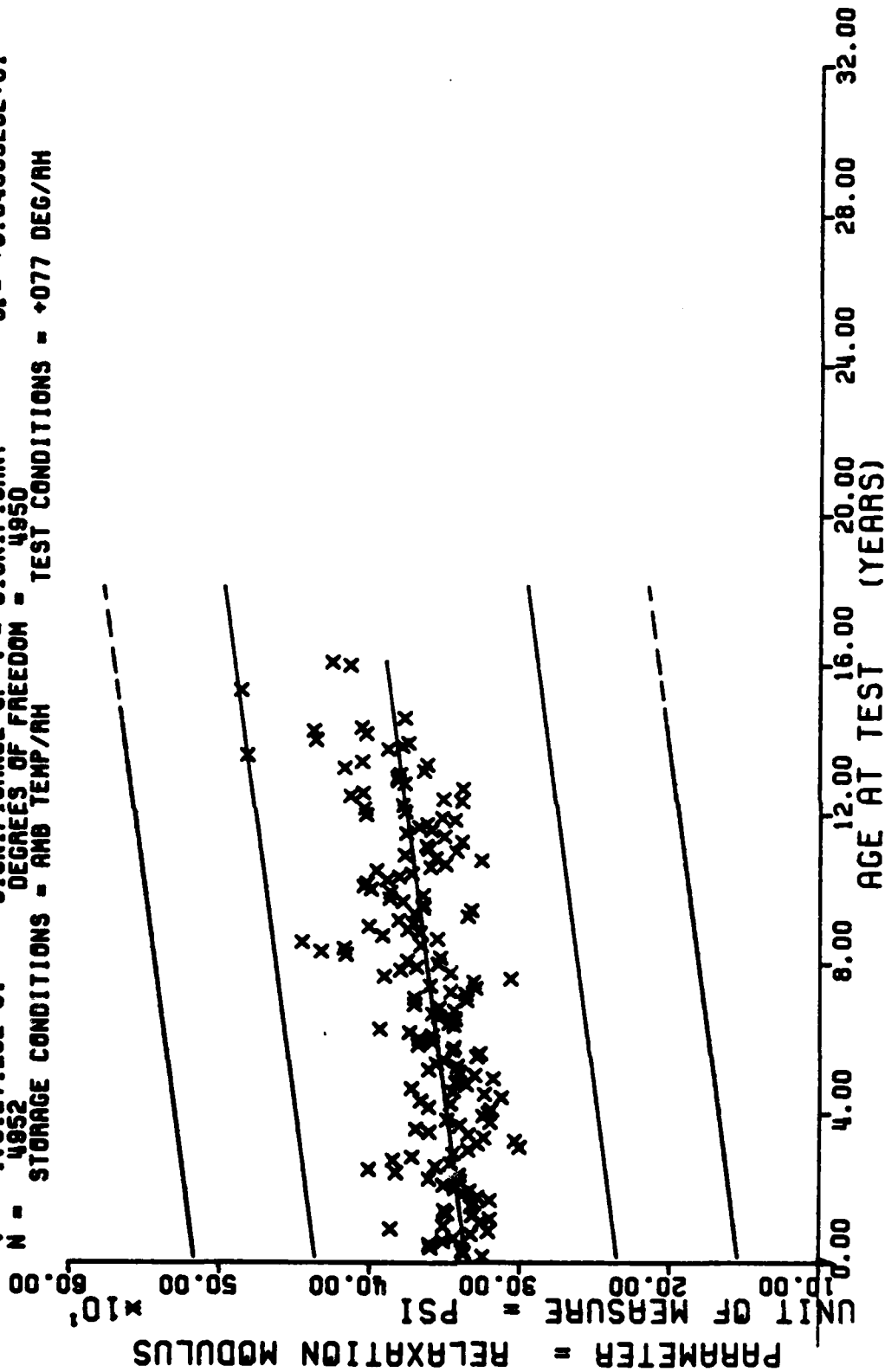
$Y = ((+4.1508463E+02) + (+3.7368038E-01) \cdot X)$   
 $F = +1.7881223E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $G = +8.0014268E+01$   
 $A = +1.8670153E-01$  SIGNIFICANCE OF A = SIGNIFICANT  $S = +2.7843347E-02$   
 $I = +1.3372068E+01$  SIGNIFICANCE OF I = SIGNIFICANT  $S_1 = +7.8615280E+01$   
 $N = 4953$  DEGREES OF FREEDOM = 4951  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = +077 DEG/AH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 77 DEG F, TPH-1011

Figure 41

$F = +1.7292153E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $G = +8.1492411E+01$   
 $R = +1.6341583E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S = +2.1469121E-02$   
 $I = +1.3127128E+01$  SIGNIFICANCE OF I = SIGNIFICANT  $S = +6.0455328E+01$   
 $N = 4952$  DEGREES OF FREEDOM = 4950  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +077 DEG/RH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 77 DEG F, TPH-1011

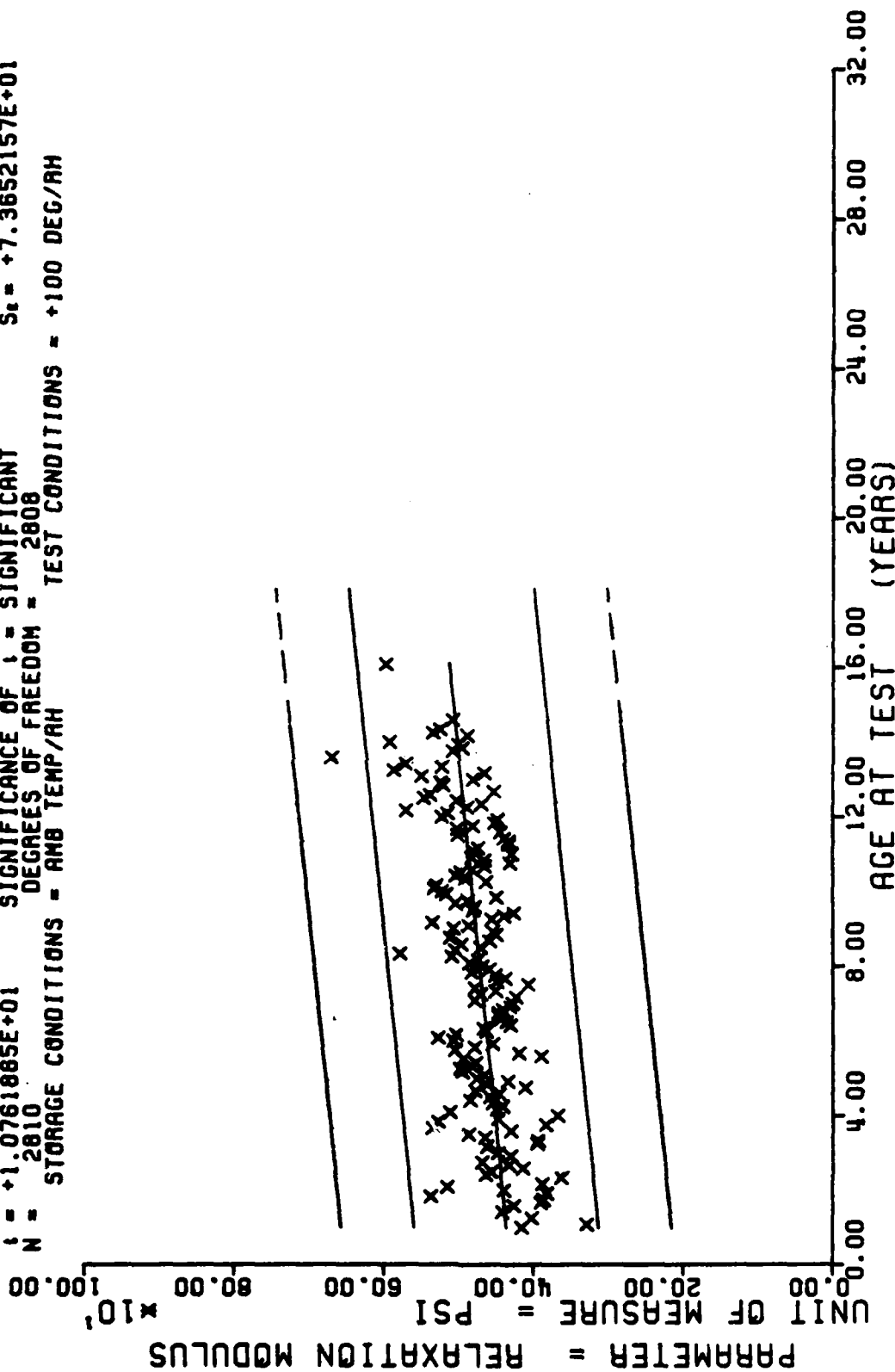
Figure 42

[illegible]

WILCOX 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC., 100 DEG F., TPH-1011

This sample size summary is applicable to figures 43 thru 46

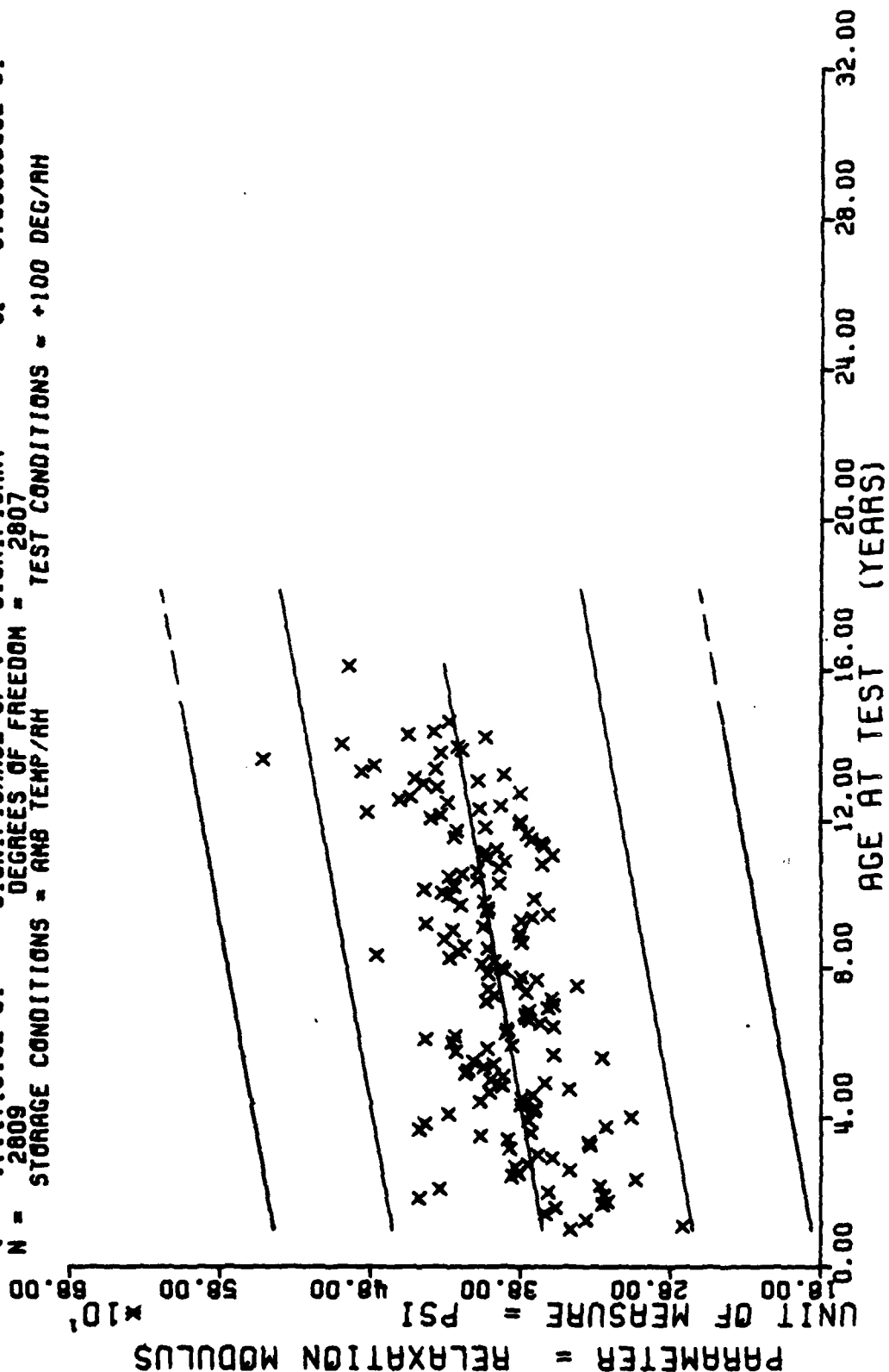
$F = +1.1581774E+02$   
 $R = +1.9902718E-01$   
 $t = +1.0761865E+01$   
 $N = 2810$   
 $Y = ((+4.3090804E+02) + (+4.2187122E-01) \times X)$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF t = SIGNIFICANT  
 DEGREES OF FREEDOM = 2808  
 STORAGE CONDITIONS = AMB TEMP/RH  
 TEST CONDITIONS = +100 DEG/RH



WING 6. STRESS RELAXATION MODULUS. 3.0% STRAIN, 10 SEC, 100 DEG F, TPH-1011

Figure 43

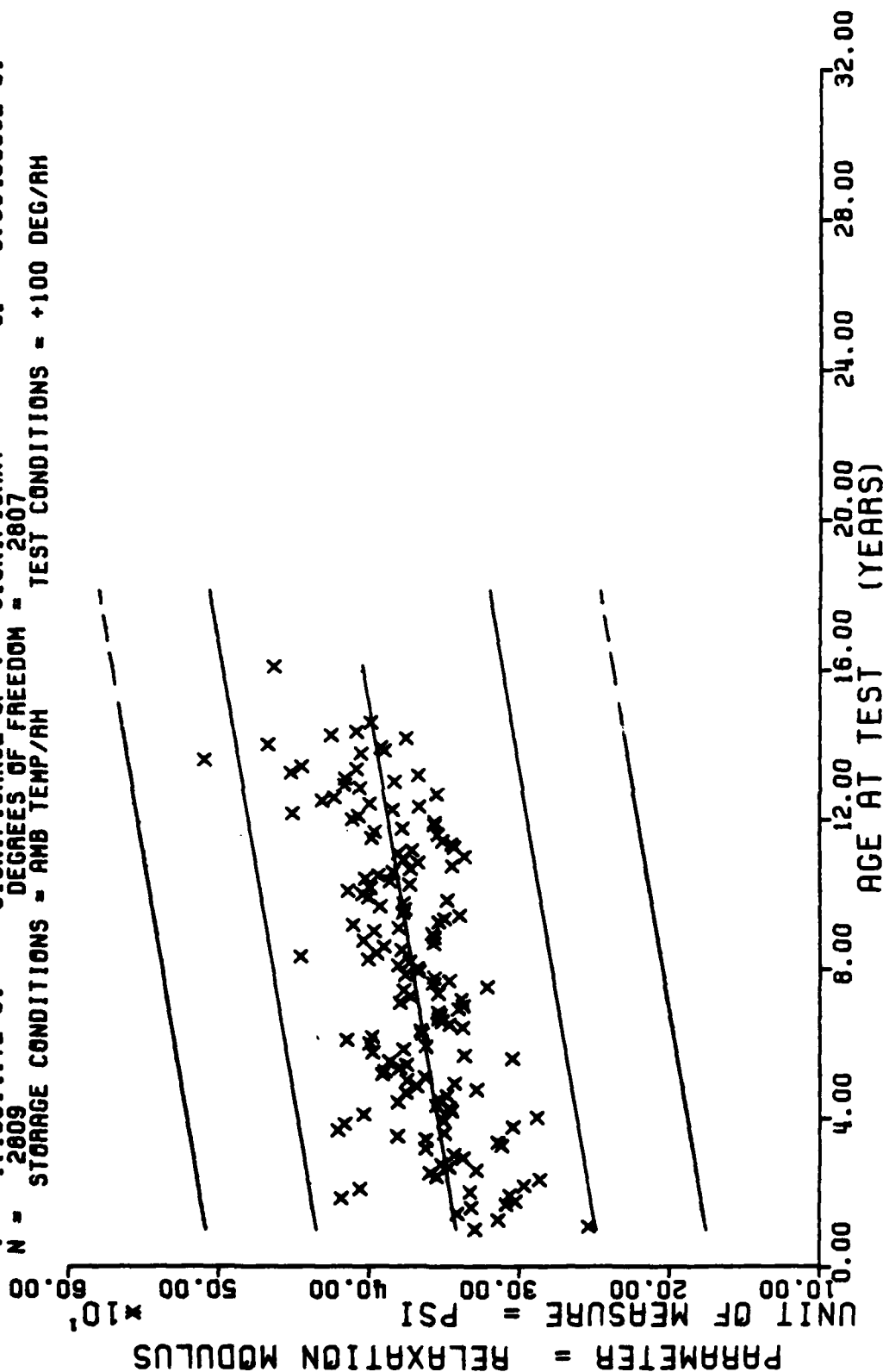
$F = +1.3159805E+02$  SIGNIFICANCE OF F = (+3.6481107E-01) \* X)  
 $R = +2.1161898E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +1.1471819E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 2809$  DEGREES OF FREEDOM = 2807  
 STORAGE CONDITIONS = 808 TEMP/8H TEST CONDITIONS = +100 DEG/8H



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC, 100 DEG F, TPH-1011

Figure 44

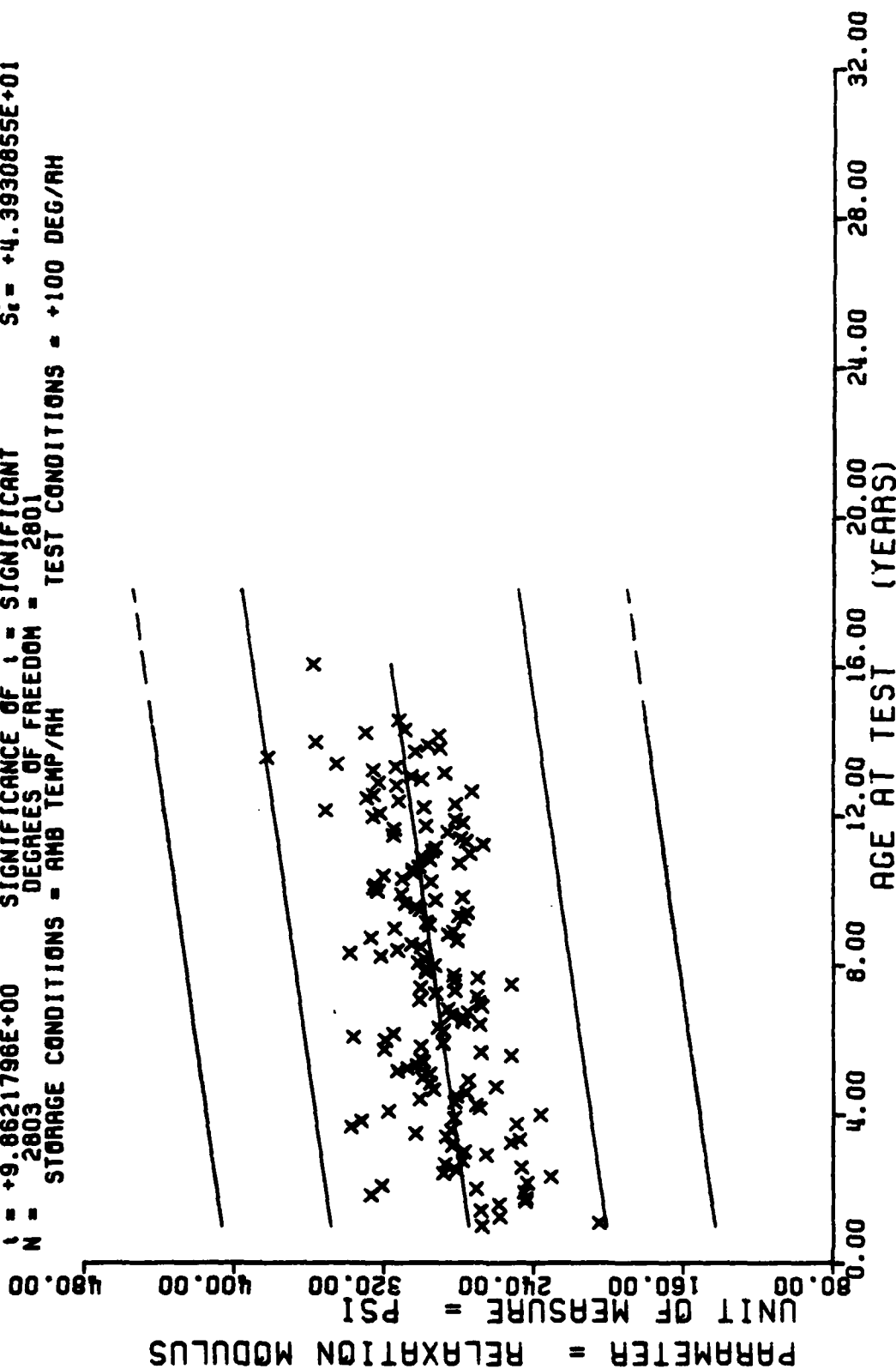
$Y = ((+3.3808761E+02) + (+3.4550509E-01) \times X)$   
 $F = +1.3645550E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma_r = +5.6869041E+01$   
 $R = +2.1531128E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +2.9577327E-02$   
 $t = +1.1681417E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_t = +5.5545096E+01$   
 $N = 2809$  DEGREES OF FREEDOM = 2807  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = +100 DEG/AH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 100 DEG F, TPH-1011

Figure 45

$F = +9.7262588E+01$  SIGNIFICANCE OF F = (+2.3085890E-01) \* X)  
 $R = +1.8319096E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +9.8621798E+00$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 2803$  DEGREES OF FREEDOM = 2801  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = +100 DEG/AH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 100 DEG F, TPH-1011

Figure 46

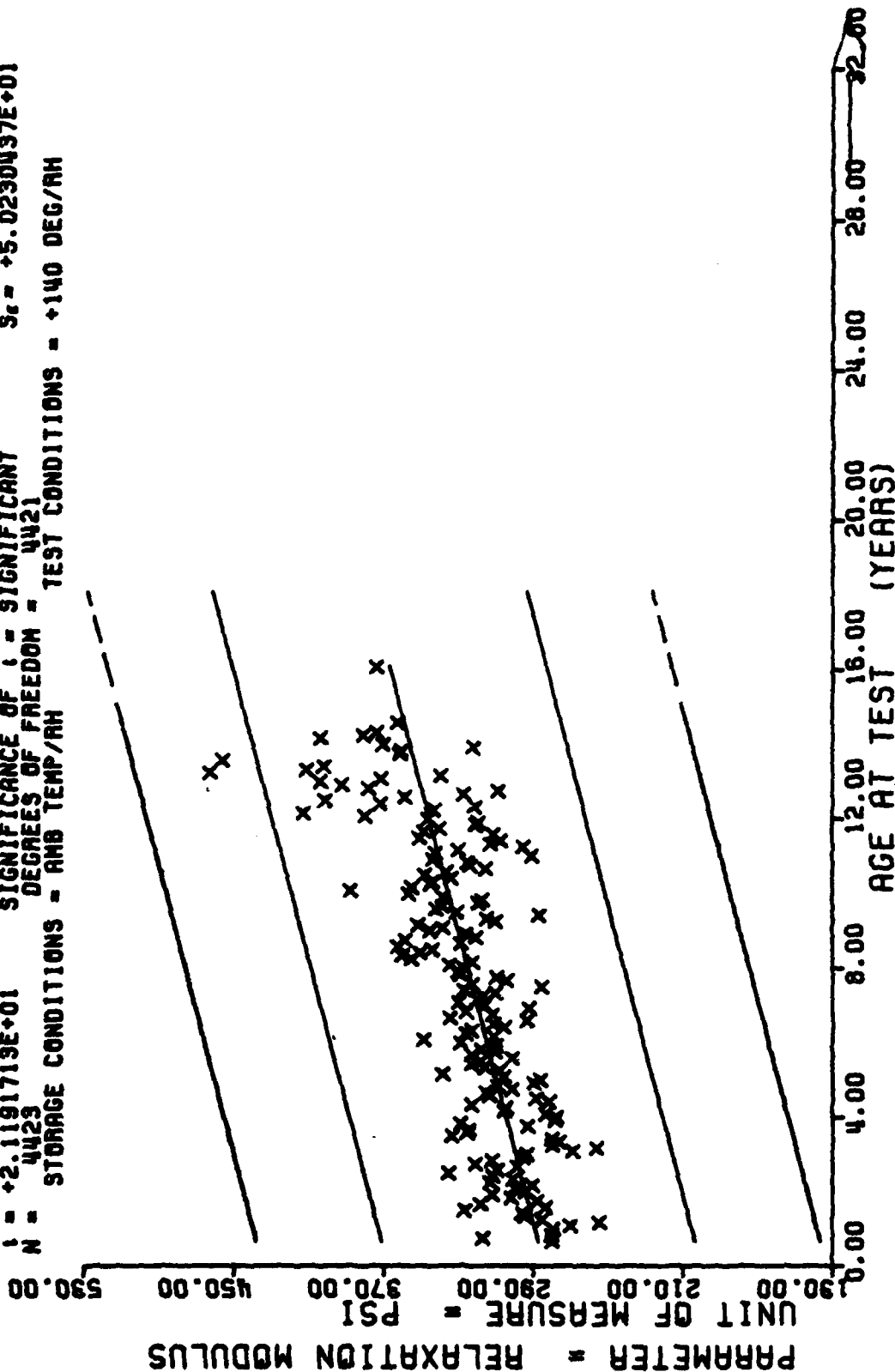
[illegible]

WITH 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC., 140 DEG F, TPH-1011

**This sample size summary is applicable to figures 47 thru 50**



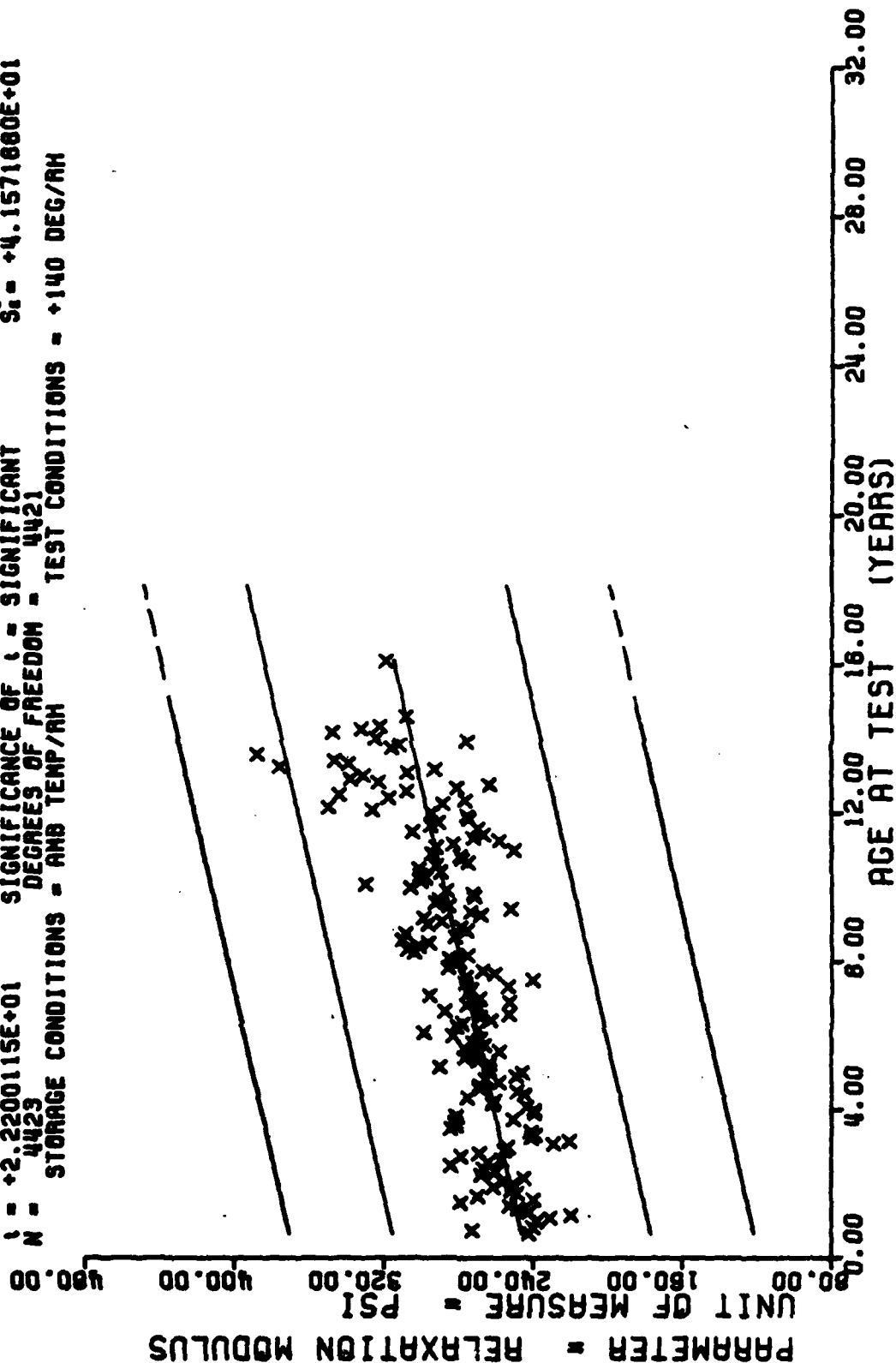
$Y = ((+2.8378737E+02) + (+4.2864919E-01) * X)$   
 $F = +4.4908874E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma = +5.2714007E+01$   
 $R = +3.0366703E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +2.0227207E-02$   
 $t = +2.1191719E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_c = +5.0230437E+01$   
 $N = 4423$  DEGREES OF FREEDOM = 4421  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = +140 DEG/AH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 140 DEG F, TPH-1011

Figure 47

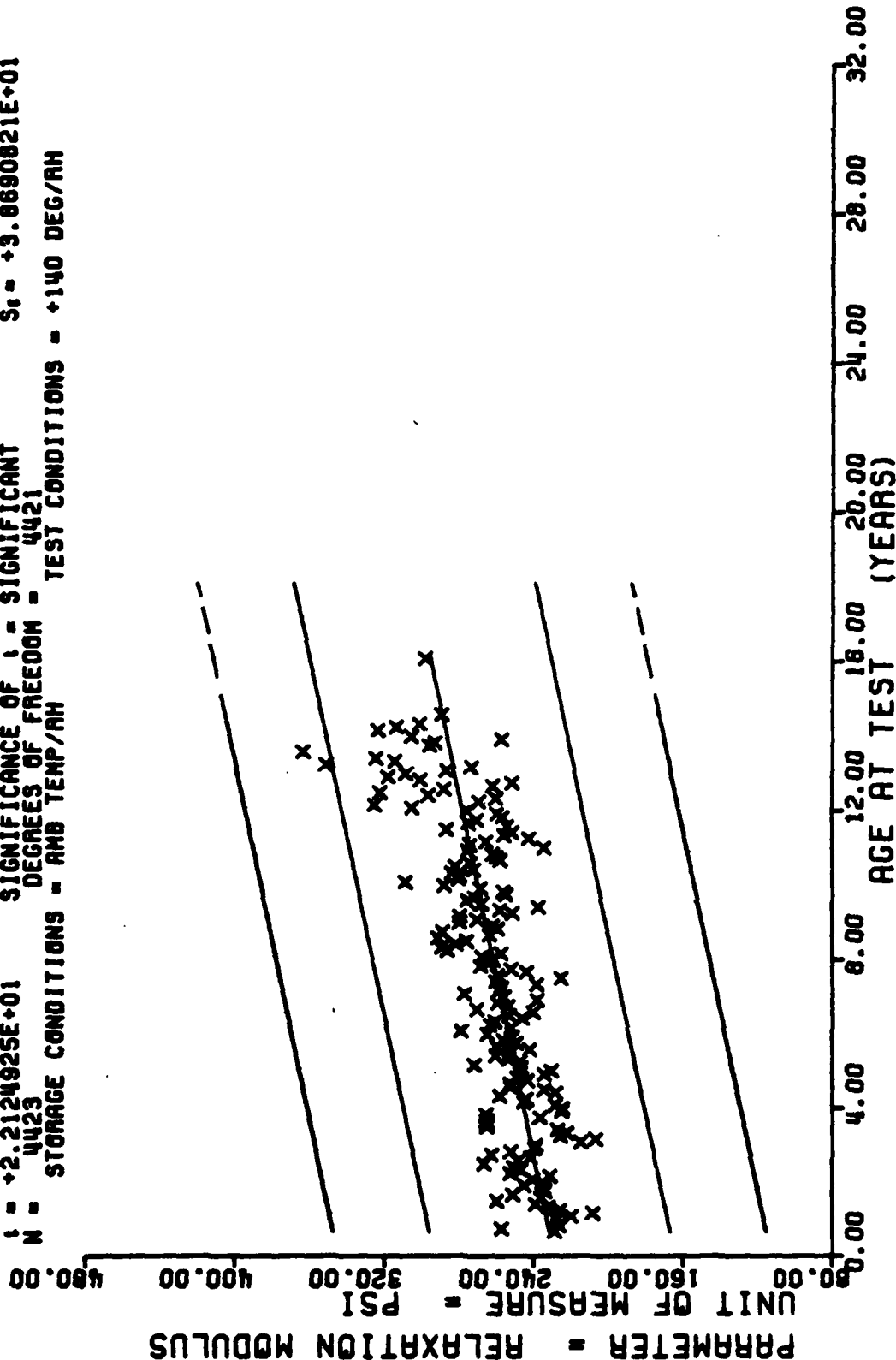
$F = +4.9204515E+02$  SIGNIFICANCE OF F = (+3.7184121E-01) \* X)  
 $A = +3.1869740E-01$  SIGNIFICANT  
 $I = +2.2200115E+01$  SIGNIFICANT  
 $N = 4423$  DEGREES OF FREEDOM = 4421  
 STORAGE CONDITIONS = AMB TEMP/AM TEST CONDITIONS = +140 DEG/AM



WING 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC. 140 DEG F. TPH-1011

Figure 48

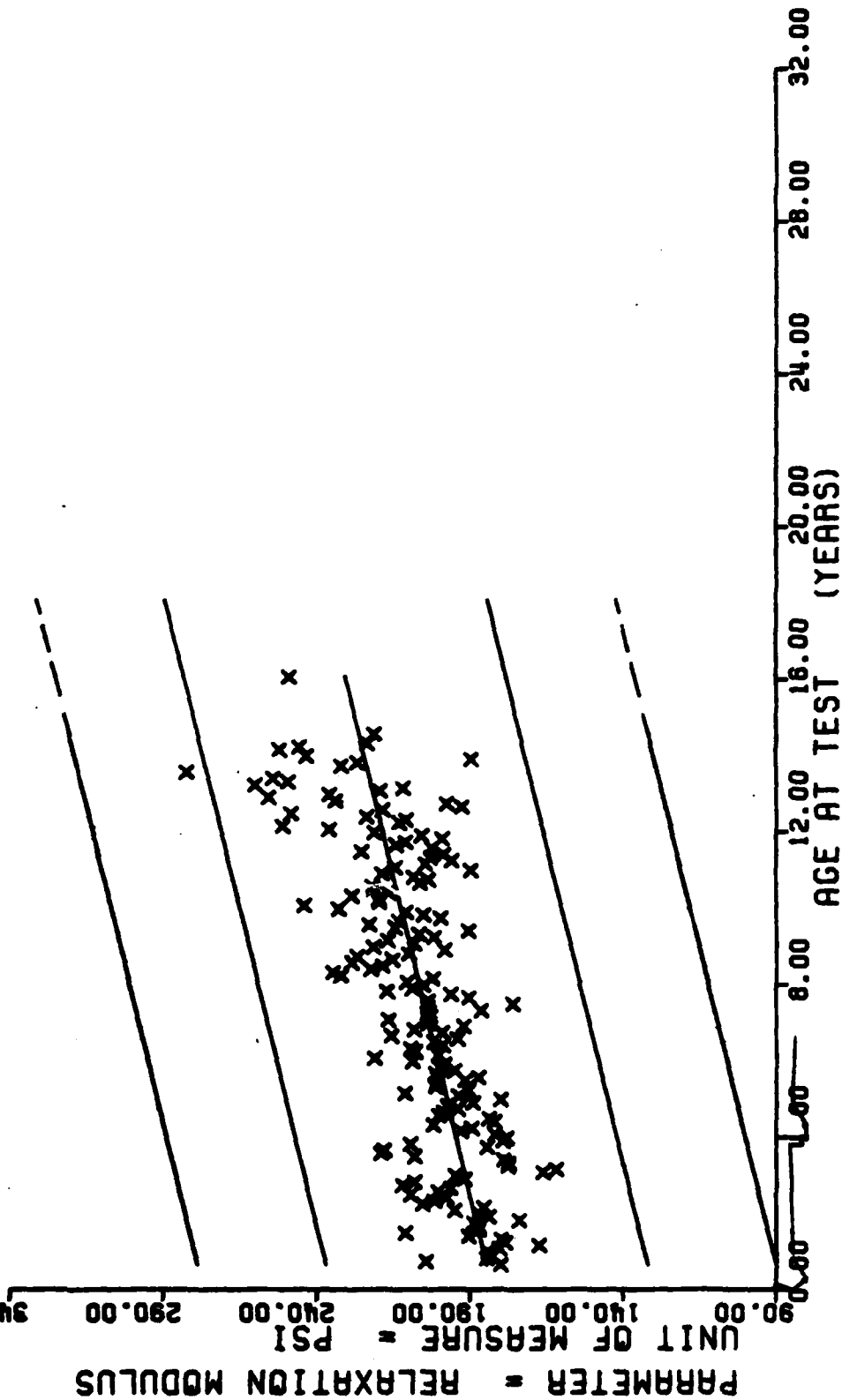
$F = +4.0951291E+02$  ) - (( +2.2850421E+02 ) + ( +3.4471984E-01 ) \* X)  
 SIGNIFICANCE OF F = SIGNIFICANT  $G = +4.0771997E+01$   
 $R = +3.1579185E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S = +1.5580339E-02$   
 $I = +2.2124925E+01$  SIGNIFICANCE OF I = SIGNIFICANT  $S_1 = +3.8690821E+01$   
 $N = 4423$  DEGREES OF FREEDOM = 4421  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = +140 DEG/AH



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 140 DEG F, TPH-1011

Figure 49

$Y = ((+1.8258401E+02) + (+2.4989123E-01) \times X)$   
 $F = +3.8828392E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma^2 = +3.2838120E+01$   
 $R = +2.8428920E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +1.2881866E-02$   
 $t = +1.9704921E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_e = +3.1466737E+01$   
 $N = 4418$  DEGREES OF FREEDOM = 4418  
 STORAGE CONDITIONS = AMB TEMP/AM TEST CONDITIONS = +140 DEG/AM



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 140 DEG F, TPH-1011

Figure 50

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
3	3	34	51	59	42	84	24	109	9
9	9	35	33	60	63	85	9	110	9
10	6	36	57	61	69	86	21	111	6
12	24	37	21	62	73	87	27	112	36
13	24	38	18	63	66	88	30	113	54
14	12	39	48	64	51	89	30	114	41
15	24	40	18	65	36	90	39	115	24
16	18	41	21	66	45	91	27	116	39
17	33	42	10	67	30	92	18	117	21
18	18	43	9	68	51	93	24	118	20
19	9	44	6	69	78	94	23	119	15
20	6	45	6	70	80	95	30	120	32
21	18	46	6	71	45	96	102	121	12
22	9	47	30	72	75	97	78	122	9
23	9	48	42	73	50	98	95	123	15
24	33	49	42	74	54	99	42	124	21
25	35	50	36	75	51	100	20	125	15
26	24	51	57	76	39	101	19	126	24
27	24	52	68	77	27	102	9	127	17
28	26	53	27	78	42	103	21	128	15
29	50	54	33	79	18	104	6	129	6
30	42	55	33	80	24	105	12	130	30
31	33	56	42	81	36	106	3	131	54
32	54	57	54	82	27	107	6	132	12
33	30	58	57	83	18	108	27	133	15
								159	3
								160	9
								161	18
								165	3
								166	6
								167	12
								168	3
								170	3
								171	6
								172	3
								175	3
								193	3

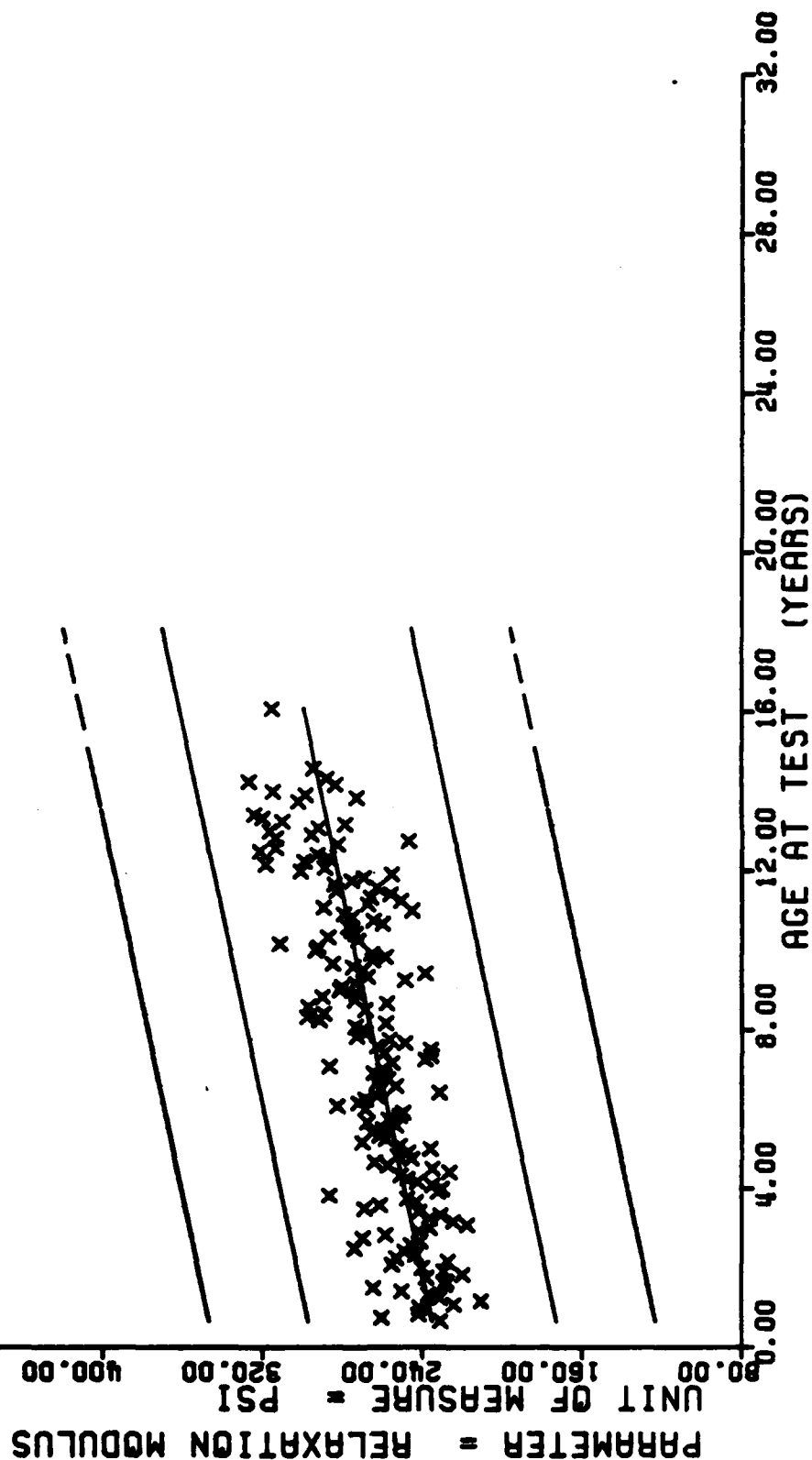
WING C, STRESS-RELAXATION, MODULUS, 3.0% STRAIN, 10 SEC, 140 DEG F, TPR-1011

This sample size summary is applicable to figures 51 thru 54

LOWING  $\alpha$ -STIFFNESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC. 130 DEG F, TPN-1011

This sample size summary is applicable to figures 51 thru 54

$Y = ((+2.3225322E+02) + (+3.4036077E-01) \times X)$   
 $F = +5.4123210E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $G = +3.9402081E+01$   
 $R = +3.2919817E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_1 = +1.4973967E-02$   
 $t = +2.3264395E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_2 = +3.7285569E+01$   
 $N = 4455$  DEGREES OF FREEDOM = 4453  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = +180 DEG/AH



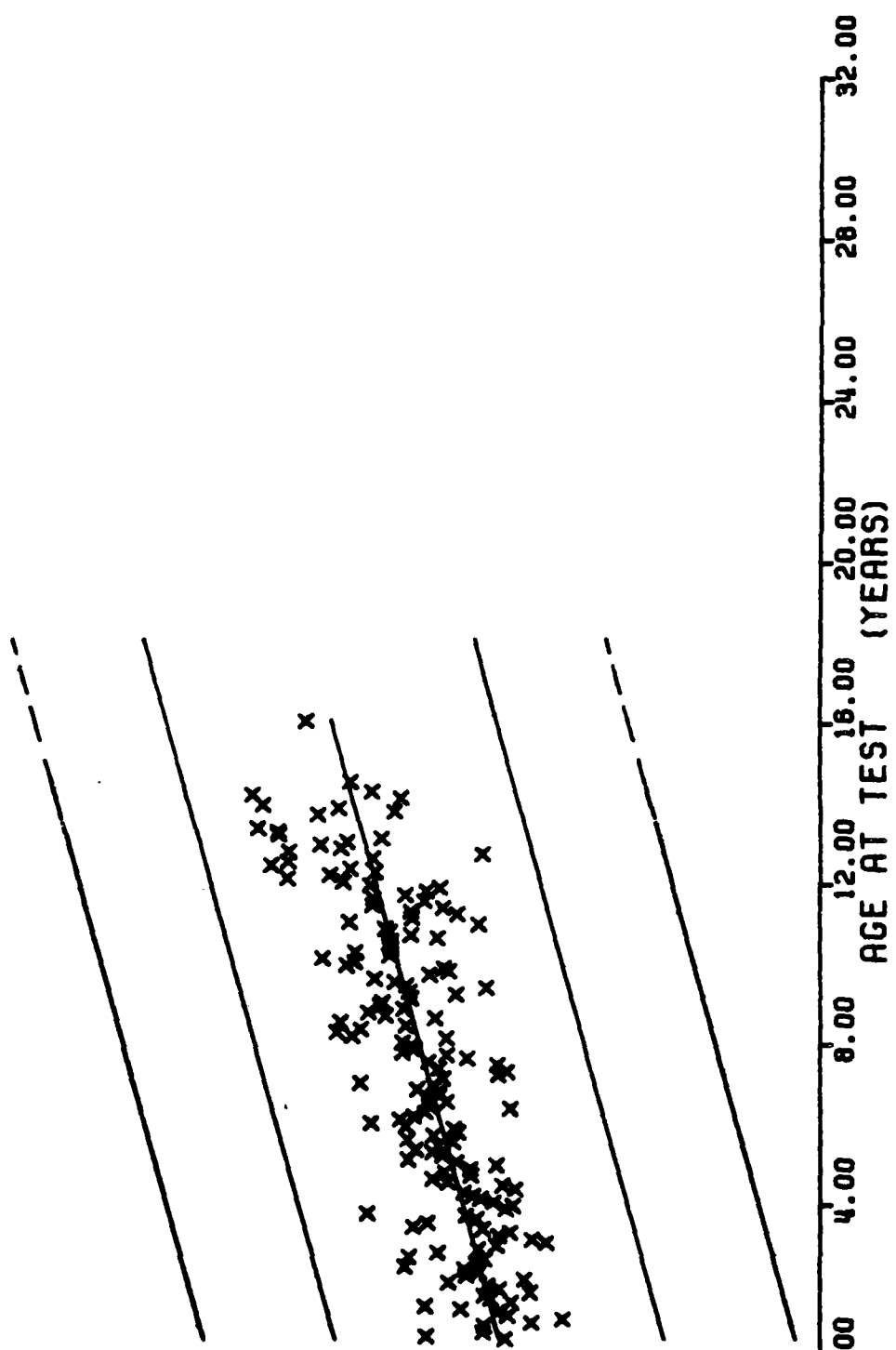
WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 180 DEG F, TPH-1011

Figure 51

$Y = ((+1.9713362E+02) + (+2.8059817E-01) * X)$   
 $F = +5.2245406E+02$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = +3.2404678E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +2.2857253E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 4455$  DEGREES OF FREEDOM = 4453  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +180 DEG/RH

PARAMETER = RELAXATION MODULUS

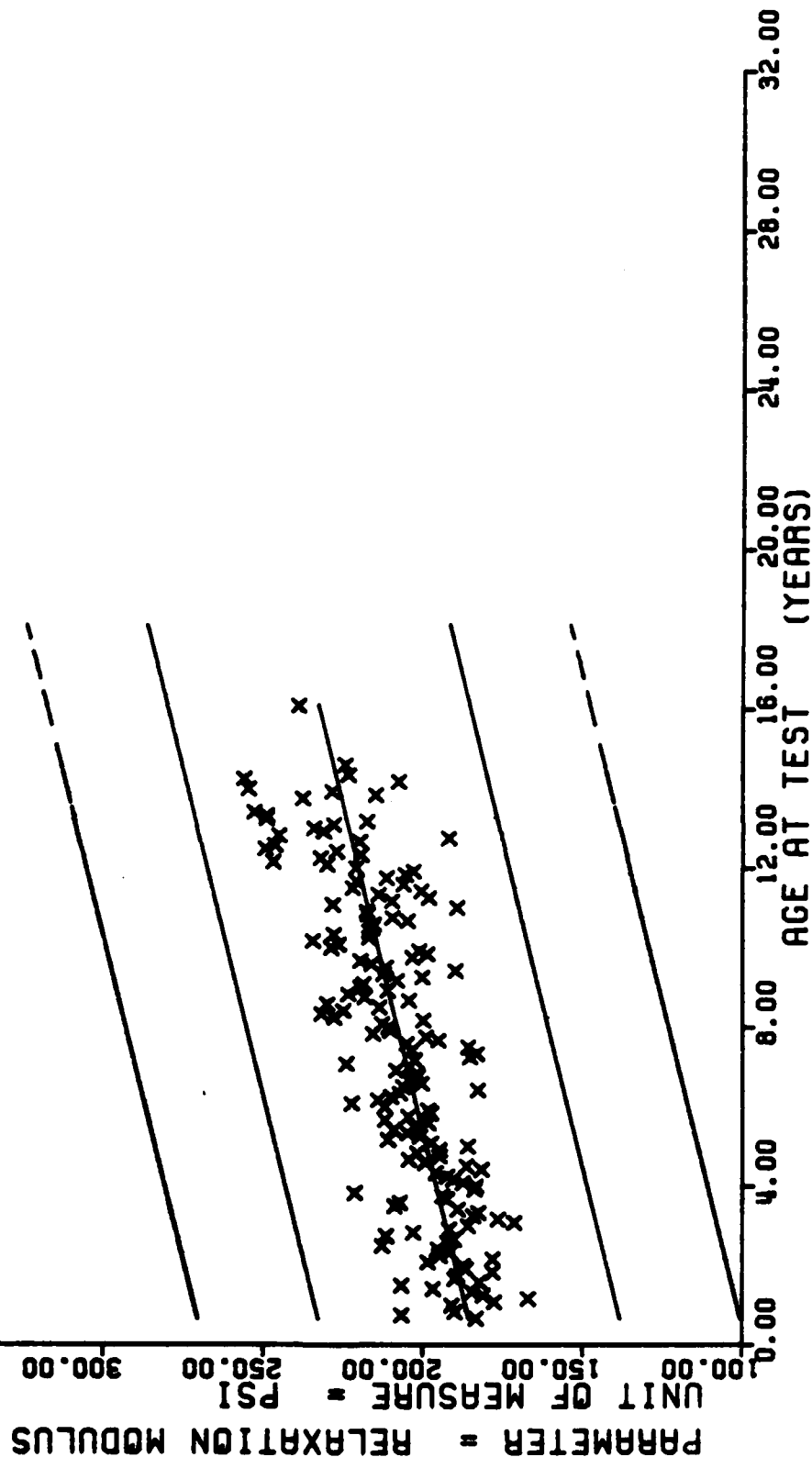
UNIT OF MEASURE = PSI



WING 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC, 180 DEG F, TPH-1011

Figure 52

$Y = ((+1.0951547E+02) + (+2.554585E-01) \times X)$   
 $F = +5.0453459E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $G = +2.9875427E+01$   
 $R = +3.1901609E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_0 = +1.1372423E-02$   
 $I = +2.2461847E+01$  SIGNIFICANCE OF I = SIGNIFICANT  $S_1 = +2.6317584E+01$   
 $N = 4455$  DEGREES OF FREEDOM = 4453  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = +180 DEG/AH

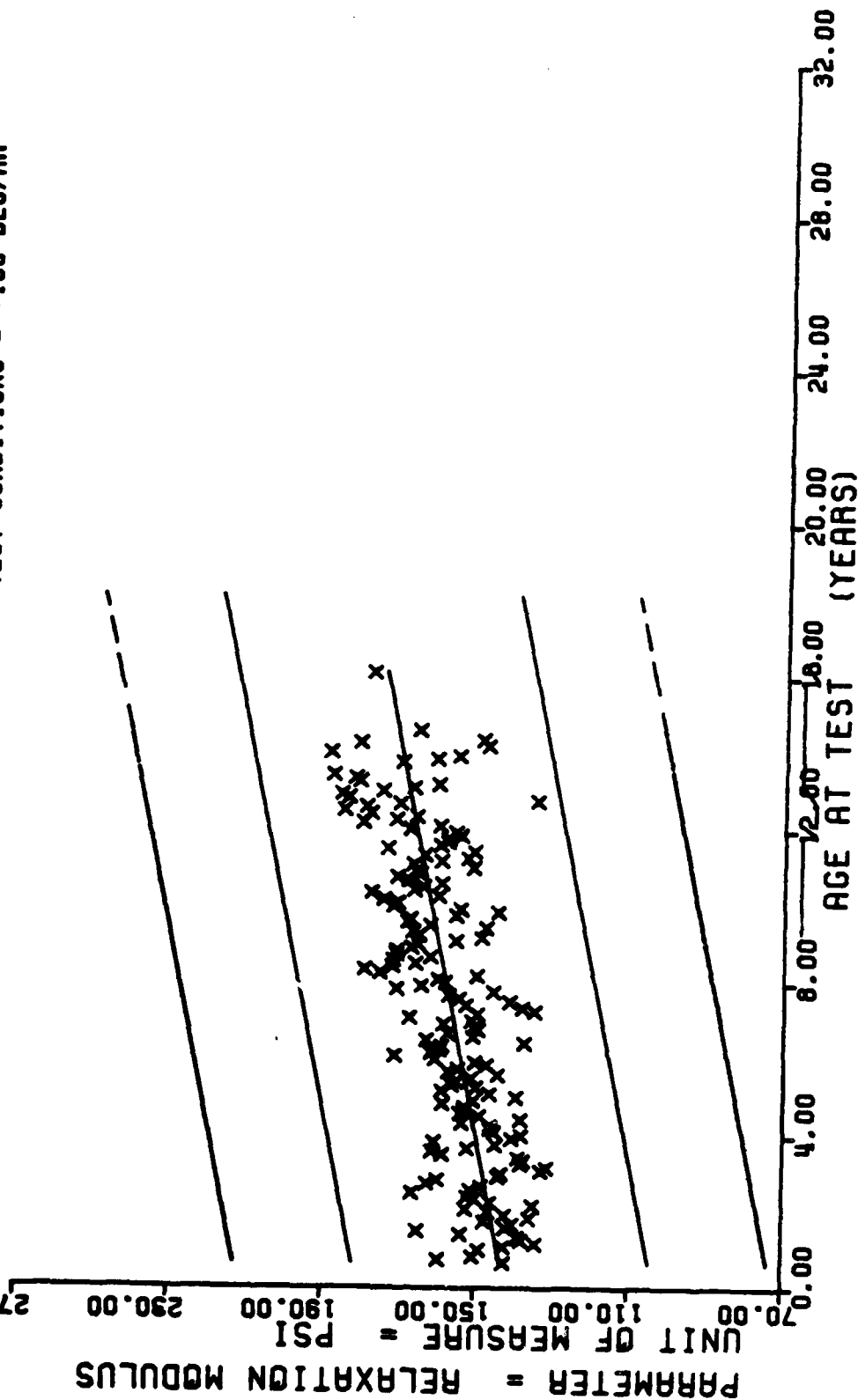


WING 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 180 DEG F, TPH-101

Figure 53



$F = +3.2587039E+02$   
 $R = +2.8119181E-01$   
 $N = +1.8051678E+01$   
 $N = 4455$   
 $Y = ((+1.4192221E+02) + (+1.8797697E-01) * X)$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF I = SIGNIFICANT  
 DEGREES OF FREEDOM = 4453  
 STORAGE CONDITIONS = AND TEMP/RH  
 TEST CONDITIONS = +180 DEG/RH



WING 6. STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 180 DEG F, TPH-1011

Figure 54

AD-A114 058

OGDEN AIR LOGISTICS CENTER HILL AFB UT PROPELLANT AN--ETC F/G 21/9.2.  
PROPELLANT SURVEILLANCE REPORT LGM-30 F & G STAGE 1 PHASE 6, SE--ETC(U)  
FEB 82 J A THOMPSON

UNCLASSIFIED

MAKPH-465(82)

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2 of 2

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14058


END  
DATE  
FILMED  
05-8-82  
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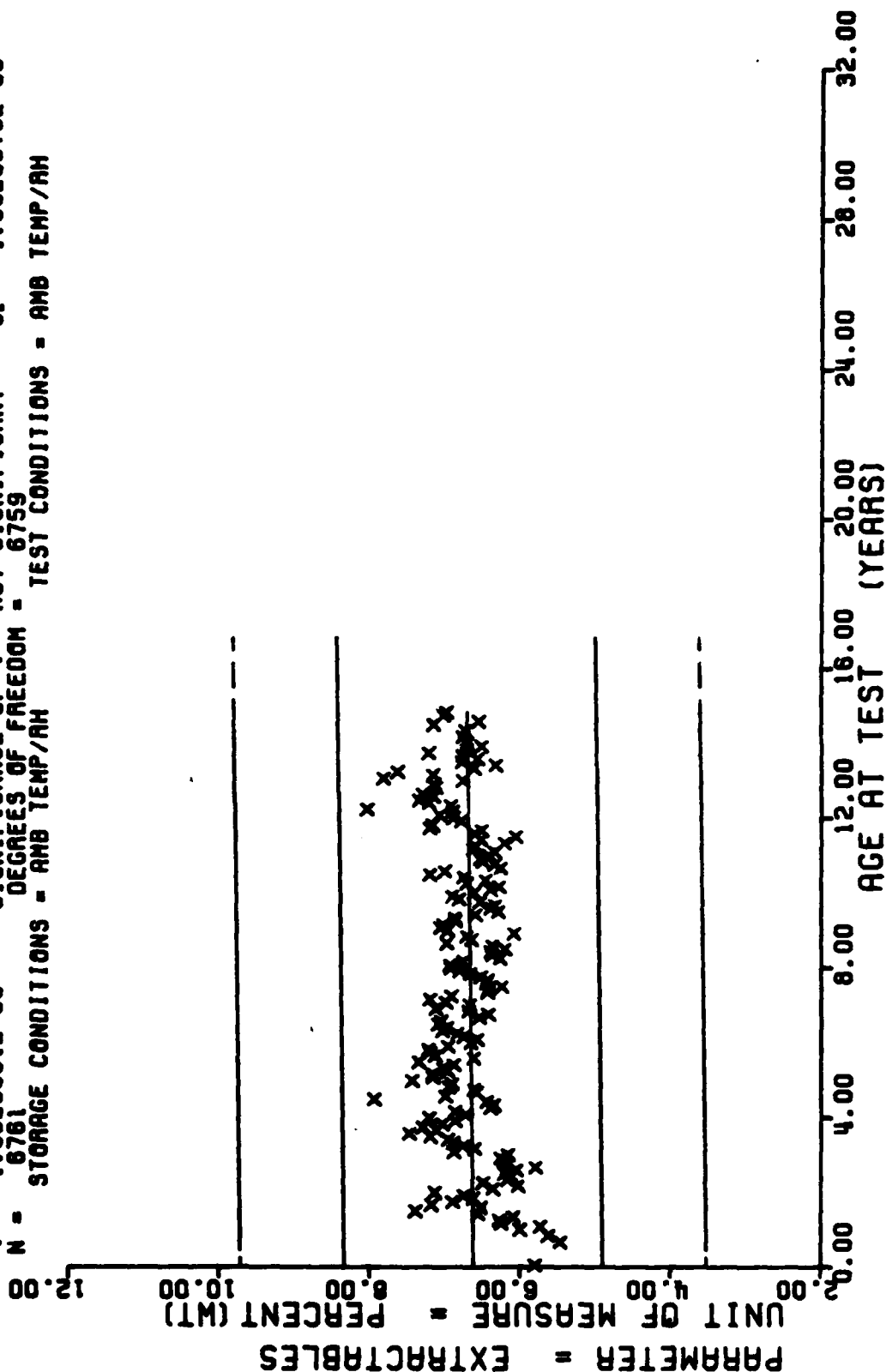
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	3	34	48	59	44	84	16	109	4	134	44	134	44
8	4	35	64	60	73	85	13	110	24	135	28	135	28
10	24	36	47	61	64	86	16	111	60	136	32	136	32
12	12	37	56	62	74	87	16	112	24	137	15	137	15
13	32	38	47	63	74	88	28	113	31	138	34	138	34
14	36	39	36	64	79	89	44	114	80	139	66	139	66
15	20	40	45	65	90	90	44	115	88	140	29	140	29
16	20	41	36	66	39	91	48	116	71	141	8	141	8
17	28	42	26	67	52	92	32	117	40	142	16	142	16
18	32	43	20	68	64	93	23	118	124	143	12	143	12
19	52	44	4	69	67	94	36	119	106	144	15	144	15
20	12	45	12	70	56	95	39	120	108	145	15	145	15
21	32	46	19	71	84	96	44	121	76	146	7	146	7
22	28	47	36	72	100	97	47	122	64	147	4	147	4
23	24	48	36	73	60	98	47	123	12	148	20	148	20
24	8	49	44	74	122	99	126	124	12	149	12	149	12
25	40	50	24	75	75	100	110	125	4	150	16	150	16
26	56	51	60	76	70	101	98	126	11	151	15	151	15
27	32	52	103	77	55	102	54	127	28	152	12	152	12
28	44	53	112	78	62	103	40	128	20	154	20	154	20
29	43	54	14	79	38	104	16	129	52	155	4	155	4
30	44	55	42	80	50	105	4	130	28	156	15	156	15
31	72	56	70	81	40	106	28	131	74	157	4	157	4
32	64	57	43	82	20	107	20	132	132	158	12	158	12
33	52	58	86	83	39	108	28	133	86	159	7	159	7
										160	19	160	19
										161	8	161	8
										162	7	162	7
										163	15	163	15
										164	3	164	3
										165	8	165	8
										166	4	166	4
										167	4	167	4
										168	7	168	7
										170	15	170	15
										172	16	172	16
										174	8	174	8
										175	8	175	8
										177	4	177	4
										178	4	178	4

STAGE 1. WING 6. TP-H1011. SOL GEL. CROSSLINK DENSITY

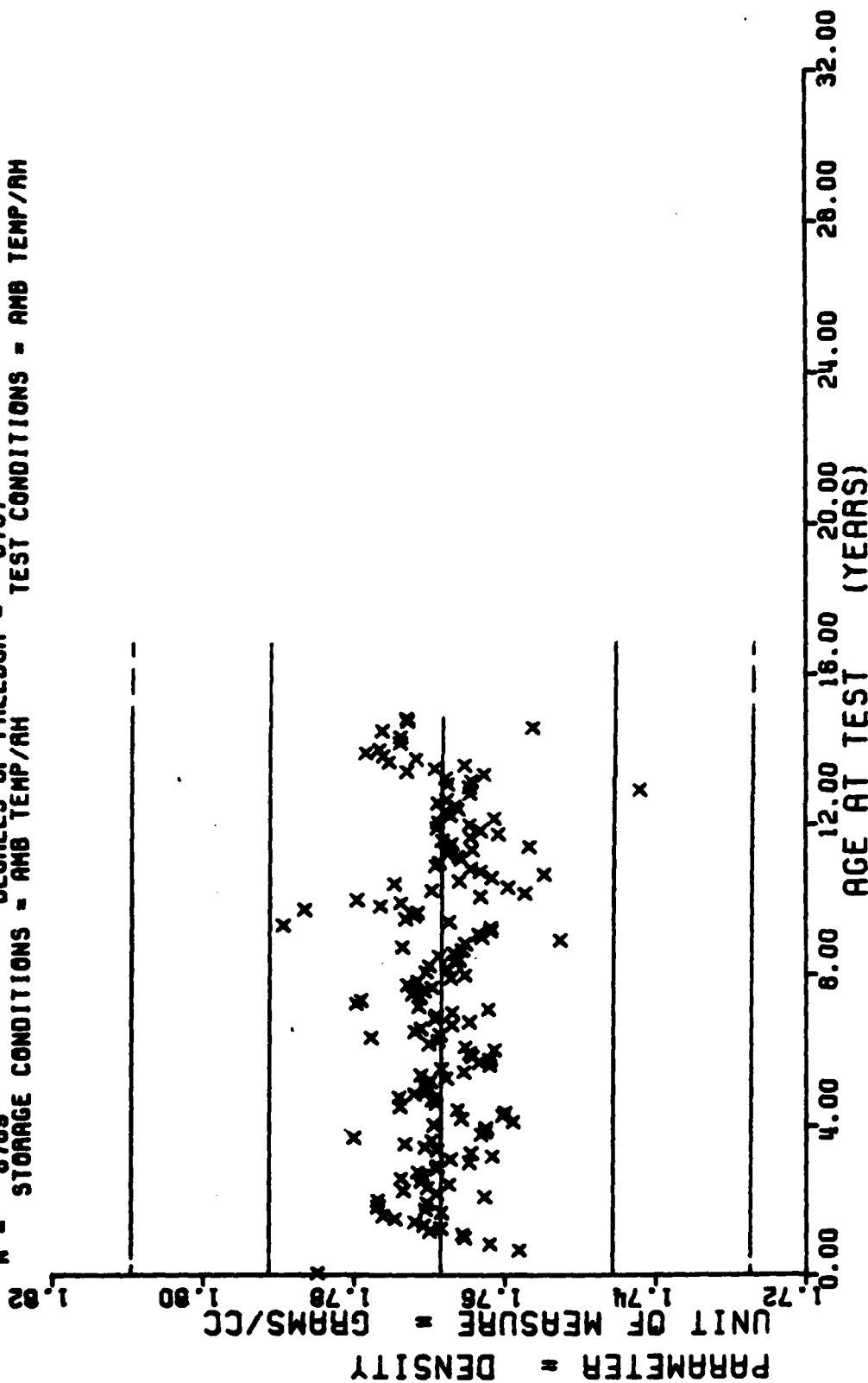
This sample size summary is applicable to figures 55 thru 57

$Y = ((+8.6208423E+00) + (+5.0855188E-04) \times X)$   
 $F = +2.4423723E+00$  SIGNIFICANCE OF F = NOT SIGNIFICANT  $G = +1.0930775E+00$   
 $R = +1.9005804E-02$  SIGNIFICANCE OF R = NOT SIGNIFICANT  $S_1 = +3.2540881E-04$   
 $I = +1.5828091E+00$  SIGNIFICANCE OF I = NOT SIGNIFICANT  $S_2 = +1.0329673E+00$   
 $N = 6761$  DEGREES OF FREEDOM = 6759  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



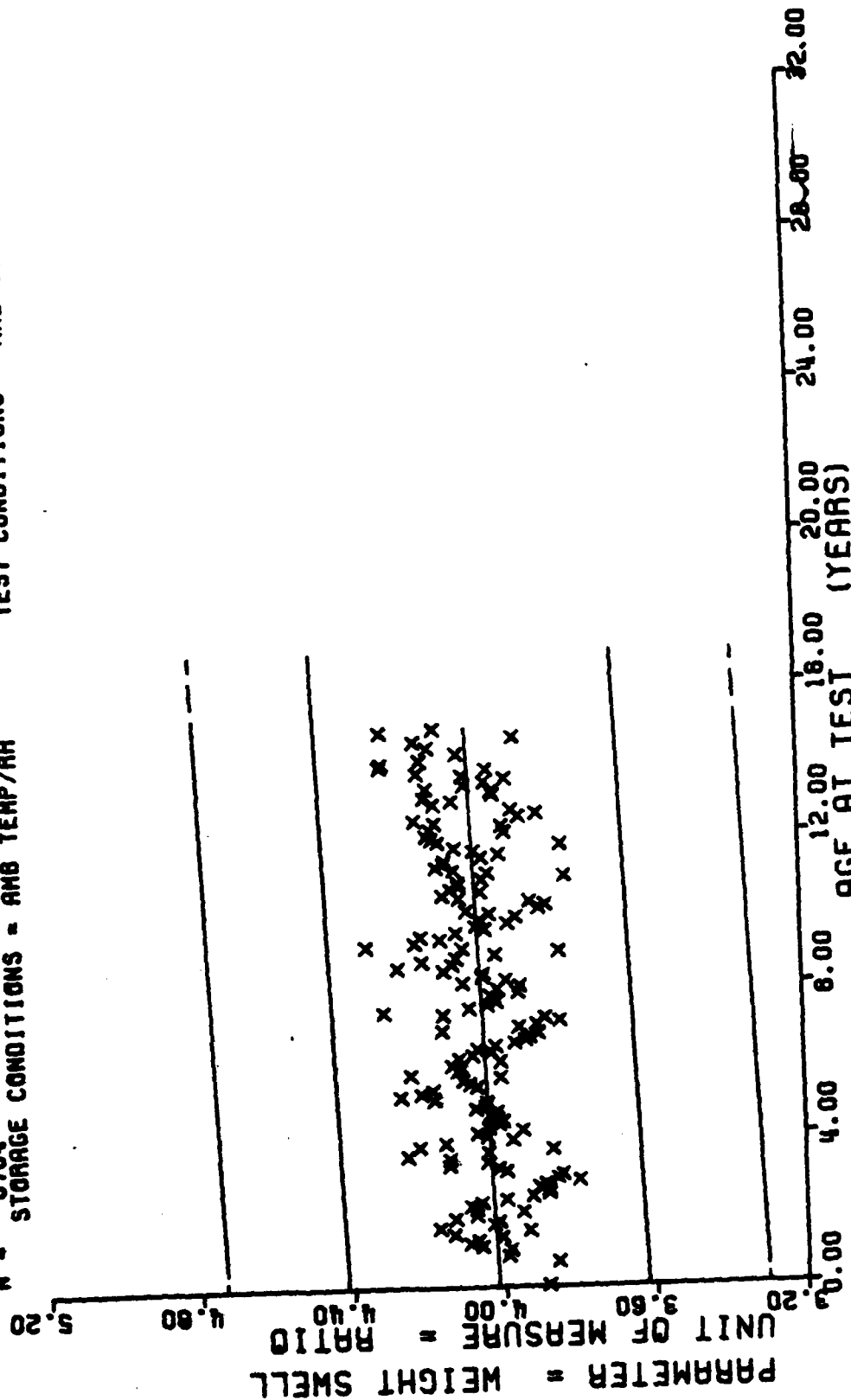
STAGE 1, WING 6 TP-H1011, SOL GEL, PERCENT EXTRACTABLES

$Y = ((+1.7685651E+00) + (-3.4450589E-06) \times X)$   
 $F = +6.3688068E-01$  SIGNIFICANCE OF F = NOT SIGNIFICANT  $\sigma^2 = +1.3884924E-02$   
 $R = -9.7160848E-03$  SIGNIFICANCE OF R = NOT SIGNIFICANT  $S_e = +4.3100943E-06$   
 $t = +7.9830012E-01$  SIGNIFICANCE OF t = NOT SIGNIFICANT  $S_i = +1.3685289E-02$   
 $N = 6769$  DEGREES OF FREEDOM = 6767  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



STAGE 1, WING 6, TP-H1011, SOL GEL, DENSITY

$Y = 11 + 4.0187593E+00$  ) +  $(+3.0958831E-04)$  ) \*  $X$   
 $F = +1.6957268E+01$  SIGNIFICANCE OF  $F =$  SIGNIFICANT  $G = +2.3895946E-01$   
 $R = +5.0014585E-02$  SIGNIFICANCE OF  $R =$  SIGNIFICANT  $S = +7.5160742E-05$   
 $t = +4.1179203E+00$  SIGNIFICANCE OF  $t =$  SIGNIFICANT  $S_1 = +2.3867805E-01$   
 $N = 6764$  DEGREES OF FREEDOM = 6762  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = AMB TEMP/AH



STAGE 1, WING 6, TP-H1011, SOL GEL, GEL SWELL RATIO

Figure 57

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	3	34	48	59	48	109	4
6	4	35	64	60	73	110	24
10	24	36	47	61	64	111	60
12	12	37	56	62	74	112	24
13	32	38	47	63	74	113	31
14	36	39	36	64	79	114	80
15	20	40	45	65	90	115	88
16	20	41	36	66	39	116	71
17	28	42	26	67	52	117	40
18	32	43	20	68	72	118	124
19	52	44	4	69	75	119	106
20	12	45	12	70	89	120	108
21	32	46	19	71	84	121	76
22	28	47	36	72	104	122	64
23	24	48	36	73	64	123	12
24	8	49	44	74	126	124	12
25	40	50	24	75	82	125	4
26	56	51	60	76	70	126	11
27	32	52	114	77	63	127	28
28	44	53	120	78	62	128	20
29	43	54	22	79	38	129	52
30	44	55	50	80	50	130	28
31	72	56	70	81	40	131	74
32	64	57	47	82	20	132	132
33	52	58	93	83	39	133	86

Age (NE)	Age (MOS)
19	172
16	174
8	175
7	177
15	178
3	
8	
4	
4	
4	
7	
15	

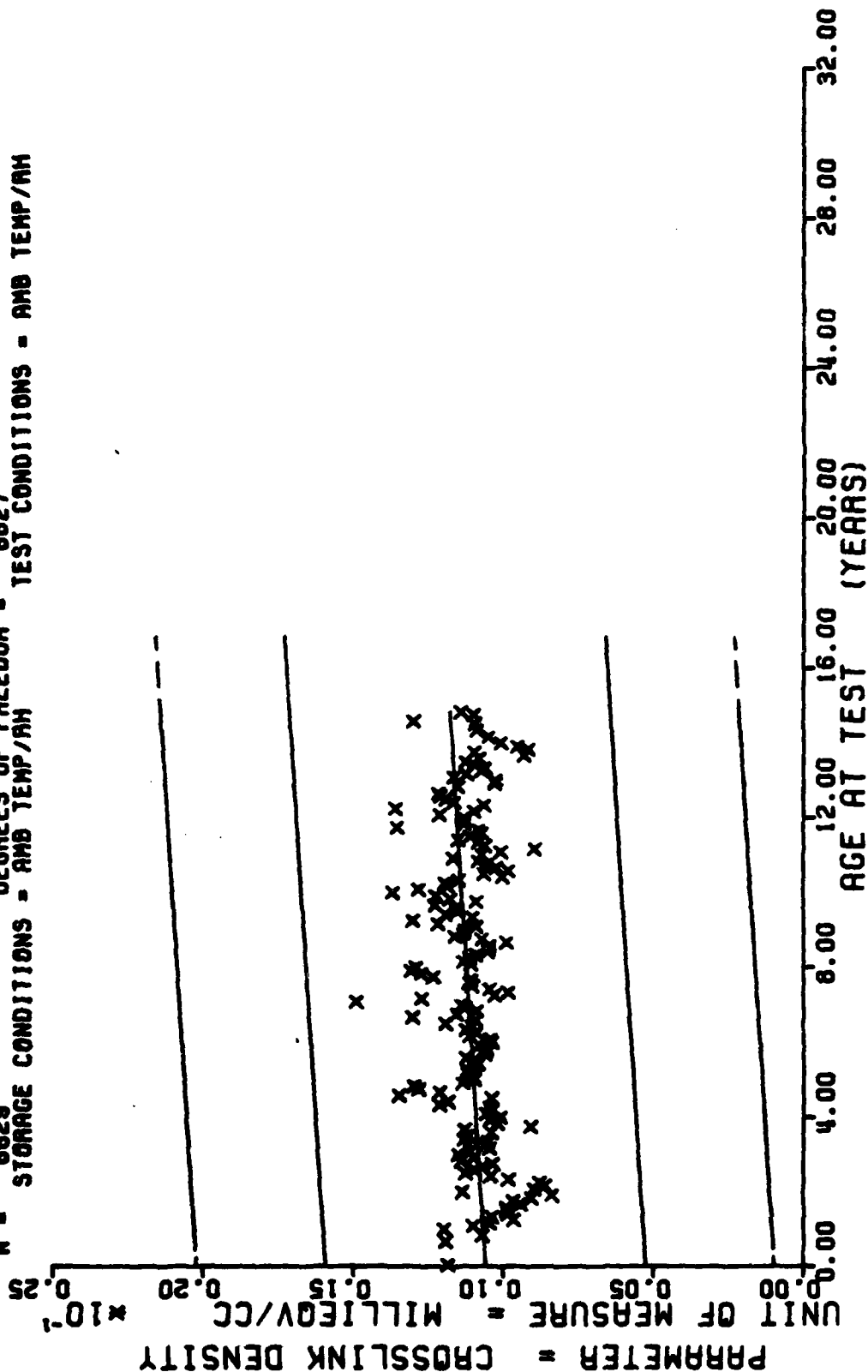
**STAGE 1. WING 6, TP-H1011, SOL GEL. CROSSLINK DENSITY**

This sample size summary is applicable to figure 58

STAGE 1, WING 6, TP-H1011, SOL GEL, CROSSLINK DENSITY

**This sample size summary is applicable to figure 58**

$F = +4.1433397E+01$  SIGNIFICANCE OF F = (+6.6238125E-06) \* X)  
 $A = +7.8824888E-02$  SIGNIFICANCE OF A = SIGNIFICANT  
 $I = +6.4366779E+00$  SIGNIFICANCE OF I = SIGNIFICANT  
 $N = 6629$  DEGREES OF FREEDOM = 6627  
 STORAGE CONDITIONS = AMB TEMP/AM TEST CONDITIONS = AMB TEMP/AM



STAGE 1. WING 6. TP-H1011. SOL GEL. CROSSLINK DENSITY



\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MUS)	IF SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP	AGE (MUS)	NR SAMP
2	3	27	29	53	72	76	75	103	12
3	15	28	34	54	42	79	23	104	15
4	10	29	59	55	34	80	54	105	6
5	11	30	31	56	74	81	51	106	15
6	23	31	51	57	84	82	32	107	15
7	18	32	67	58	60	83	38	108	9
8	24	33	56	59	43	84	25	109	39
9	24	34	61	60	53	85	33	110	36
10	40	35	39	61	72	86	27	111	18
11	24	36	32	62	99	87	35	112	28
12	40	37	43	63	94	88	32	113	114
13	51	38	29	64	92	89	55	114	53
14	52	39	48	65	37	90	57	115	57
15	52	40	36	66	37	91	48	116	51
16	63	41	12	67	62	92	32	117	110
17	15	42	24	68	62	93	19	118	37
18	65	43	24	69	65	94	40	119	63
19	28	44	16	70	63	95	45	120	84
20	28	45	31	71	40	96	50	121	51
21	17	46	30	72	33	97	98	122	12
22	22	47	37	73	85	98	75	123	9
23	11	48	64	74	72	99	47	124	3
24	19	49	17	75	74	100	39	125	9
25	64	50	60	76	70	101	27	126	3
26	22	51	90	77	45	102	14	127	3

Age	Nr	Age	Nr
153	6	165	3
154	9	166	9
155	6	167	9
156	5	168	9
157	12	169	9
158	3	170	3
159	12	171	3
160	9	172	9
161	12	175	9
162	3		

CONSTANT STRAIN

TP-H 1011

WING 0

STAGE 1

This sample size summary is applicable to figure 59

$F = +3.8022848E+02$   
 $R = -2.4118967E-01$   
 $t = +1.8489448E+01$   
 $N = 6158$   
 $Y = ((+2.5867539E+01) + (-1.6942077E-02) * X)$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF t = SIGNIFICANT  
 DEGREES OF FREEDOM = 6156  
 STORAGE CONDITIONS = AMB TEMP/AM  
 TEST CONDITIONS = AMB TEMP/AM

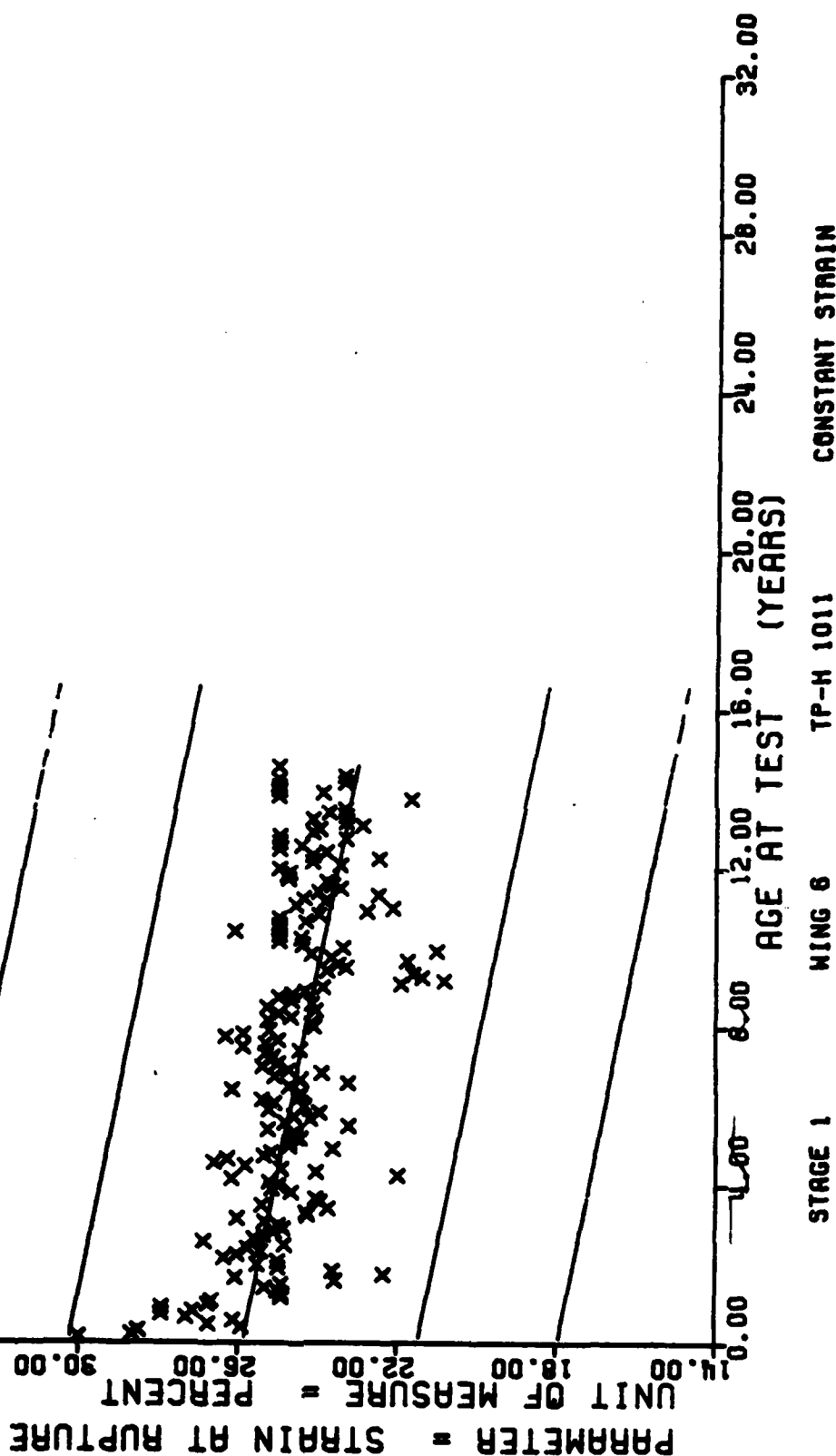


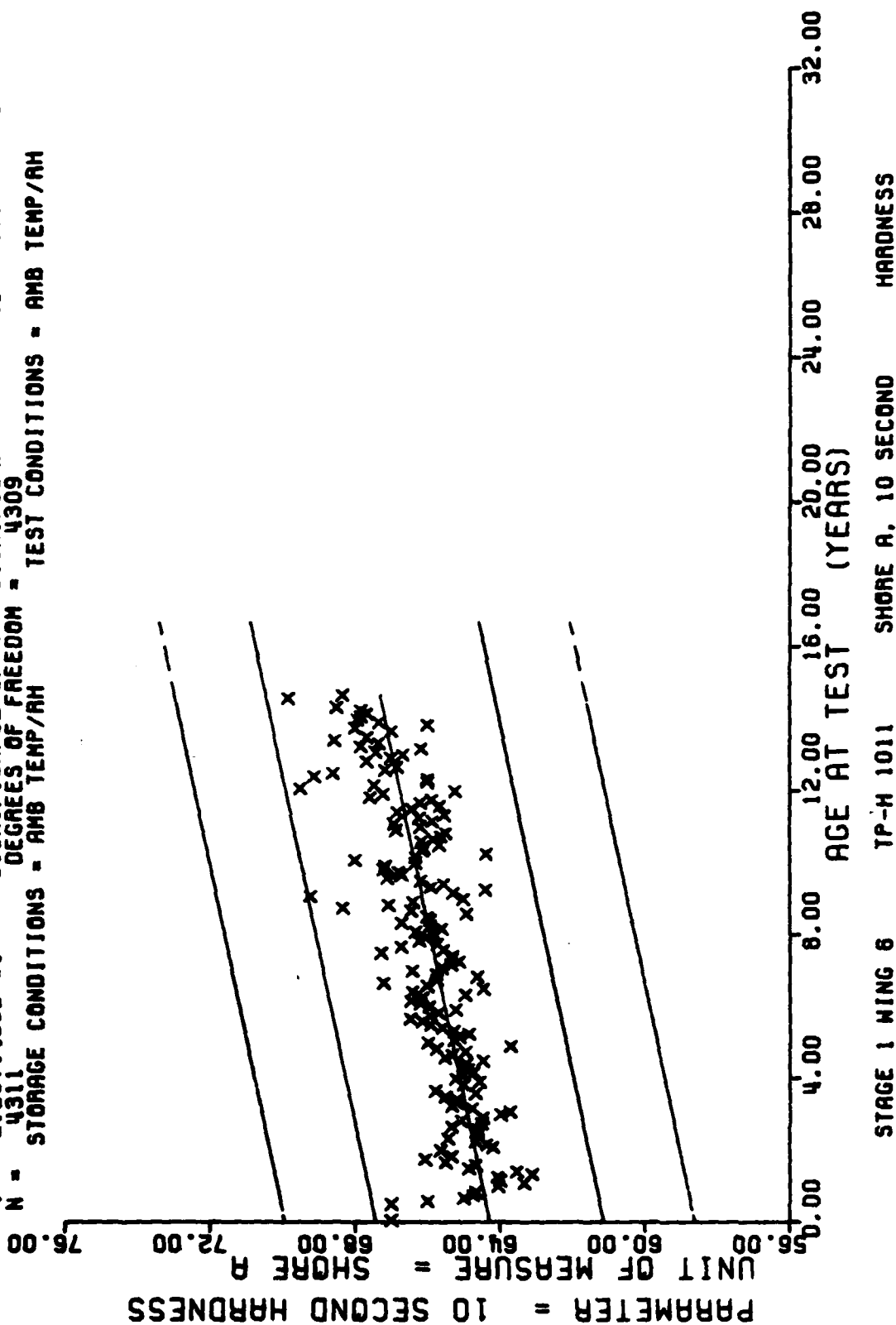
Figure 59

[illegible]

STAGE	WING	TP-H	1011	SHRE A.	10 SECOND	HARDNESS
1	1	1	1	1	1	1
2	2	2	2	2	2	2
3	3	3	3	3	3	3
4	4	4	4	4	4	4
5	5	5	5	5	5	5
6	6	6	6	6	6	6
7	7	7	7	7	7	7
8	8	8	8	8	8	8
9	9	9	9	9	9	9
10	10	10	10	10	10	10
11	11	11	11	11	11	11
12	12	12	12	12	12	12
13	13	13	13	13	13	13
14	14	14	14	14	14	14
15	15	15	15	15	15	15
16	16	16	16	16	16	16
17	17	17	17	17	17	17
18	18	18	18	18	18	18
19	19	19	19	19	19	19
20	20	20	20	20	20	20
21	21	21	21	21	21	21
22	22	22	22	22	22	22
23	23	23	23	23	23	23
24	24	24	24	24	24	24
25	25	25	25	25	25	25
26	26	26	26	26	26	26
27	27	27	27	27	27	27
28	28	28	28	28	28	28
29	29	29	29	29	29	29
30	30	30	30	30	30	30
31	31	31	31	31	31	31
32	32	32	32	32	32	32
33	33	33	33	33	33	33
34	34	34	34	34	34	34
35	35	35	35	35	35	35
36	36	36	36	36	36	36
37	37	37	37	37	37	37
38	38	38	38	38	38	38
39	39	39	39	39	39	39
40	40	40	40	40	40	40
41	41	41	41	41	41	41
42	42	42	42	42	42	42
43	43	43	43	43	43	43
44	44	44	44	44	44	44
45	45	45	45	45	45	45
46	46	46	46	46	46	46
47	47	47	47	47	47	47
48	48	48	48	48	48	48
49	49	49	49	49	49	49
50	50	50	50	50	50	50
51	51	51	51	51	51	51
52	52	52	52	52	52	52
53	53	53	53	53	53	53
54	54	54	54	54	54	54
55	55	55	55	55	55	55
56	56	56	56	56	56	56
57	57	57	57	57	57	57
58	58	58	58	58	58	58
59	59	59	59	59	59	59
60	60	60	60	60	60	60
61	61	61	61	61	61	61
62	62	62	62	62	62	62
63	63	63	63	63	63	63
64	64	64	64	64	64	64
65	65	65	65	65		

**This sample size summary is applicable to figure 60**

$F = +5.0946040E+02$  SIGNIFICANCE OF F = (+1.7187070E-02) \* X)  
 $R = +3.2516524E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +2.2571406E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 4311$  DEGREES OF FREEDOM = 4309  
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH  
 $\sigma_f = +1.9942199E+00$   
 $S_e = +7.6145323E-04$   
 $S_t = +1.8860672E+00$



\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	3	34	39	59	57	84	9	115	56
10	15	35	50	60	43	85	3	116	55
11	1	36	39	61	34	86	3	117	7
12	6	37	13	62	79	87	3	118	10
13	15	38	11	63	46	88	12	120	39
14	13	39	16	64	80	89	24	121	12
15	16	40	11	65	72	90	36	129	3
16	17	41	13	66	38	91	24	130	36
17	18	42	30	67	59	92	9	131	23
18	19	43	4	68	38	93	17	132	5
19	22	44	10	69	40	94	15	133	6
20	35	45	7	70	46	95	19	134	18
21	16	46	12	71	11	96	33	135	25
22	19	47	16	72	24	97	77	136	3
23	21	48	4	73	17	98	64	139	12
24	19	49	36	74	28	99	49	140	12
25	25	50	13	75	51	100	26		
26	27	51	38	76	26	101	21		
27	36	52	39	77	22	102	8		
28	38	53	47	78	13	103	6		
29	43	54	37	79	7	105	9		
30	24	55	25	80	21	106	6		
31	51	56	21	81	24	108	3		
32	42	57	25	82	7	113	3		
33	54	58	22	83	9	114	11		

PRESSURE TIME

MAXIMUM PRESSURE

STAGE 1 WING 6 TP-H 1011

This sample size summary is applicable to figures 61 and 62

$Y = ((+3.5836581E+03) + (-1.9186636E-01) \times X)$   
 $F = +1.0845114E+01$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = -6.0429662E-02$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +3.2931921E+00$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 2961$  DEGREES OF FREEDOM = 2959  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = 500 PSI INT PRES

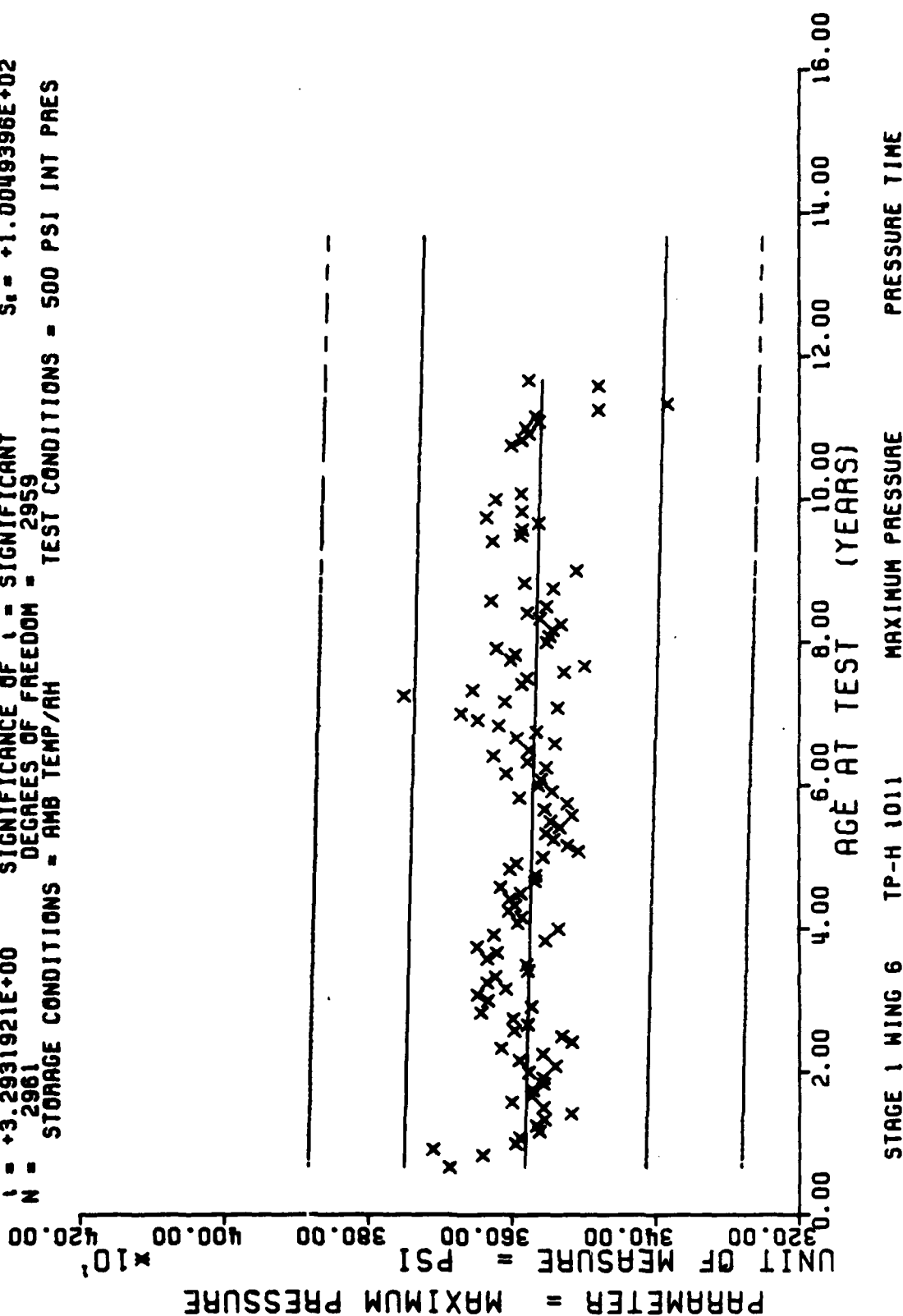


Figure 61

$Y = ((+6.9413634E-01) + (-1.1791889E-04) * X)$   
 $F = +6.7558146E+00$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = -4.7719728E-02$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +2.5991950E+00$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 2962$  DEGREES OF FREEDOM = 2960  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = 500 PSI INT PRES

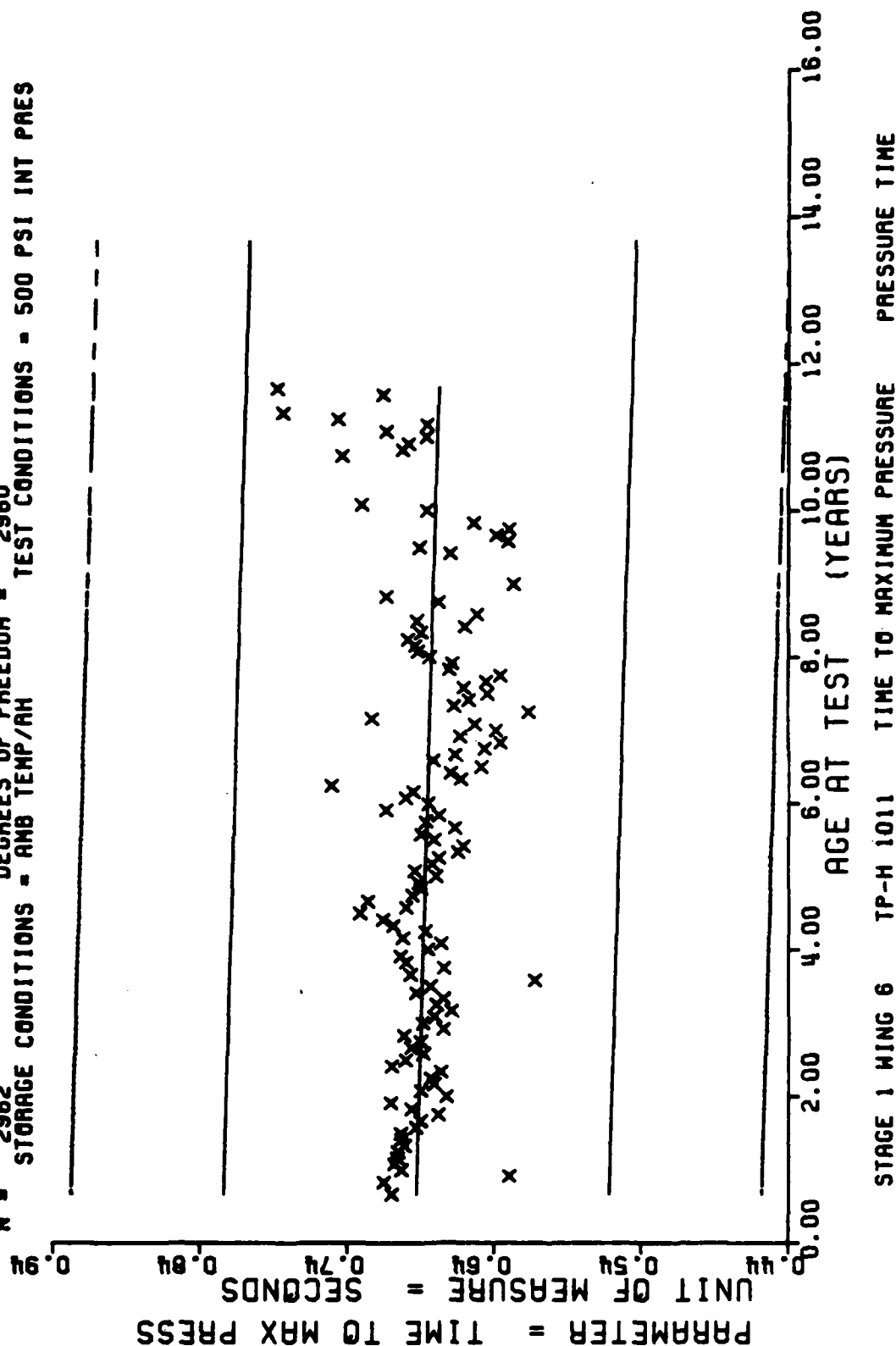


Figure 62

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	3	34	48	59	39	84	17	109	10	134	37
9	10	35	39	60	60	85	19	110	24	135	14
10	7	36	30	61	53	86	11	111	9	136	13
12	22	37	53	62	45	87	12	112	15	137	11
13	29	38	18	63	40	88	9	113	18	138	64
14	15	39	32	64	33	89	22	114	22	139	47
15	21	40	27	65	50	90	21	115	22	140	14
16	24	41	21	66	35	91	17	116	19	141	6
17	9	42	15	67	34	92	9	117	110	142	30
18	33	43	12	68	49	93	27	118	65	143	49
19	4	44	19	69	97	94	27	119	15	144	6
20	8	45	9	70	61	95	49	120	19	146	6
21	25	46	3	71	29	96	54	121	11	147	4
22	24	47	56	72	37	97	49	122	28	148	4
23	12	48	32	73	35	98	104	123	8	149	8
24	18	49	42	74	23	99	66	124	23	150	8
25	42	50	25	75	41	100	25	125	31	151	6
26	15	51	64	76	25	101	10	126	9	152	4
27	27	52	66	77	20	102	14	127	31	154	4
28	24	53	80	78	37	103	13	128	26	155	4
29	39	54	15	79	10	104	9	129	10	156	6
30	42	55	39	80	32	105	13	130	41	157	2
31	48	56	51	81	55	106	17	131	56	158	4
32	54	57	45	82	16	107	8	132	20	159	2
33	39	58	69	83	22	108	10	133	14	160	2
										161	2
										166	2
										167	4
										167	4
										168	4
										170	6
										171	4
										173	4
										175	6

STAGE 1. WING 6, 10-H1011, THERMAL COEFFICIENT OF LINEAR EXPANSION ABOVE TG

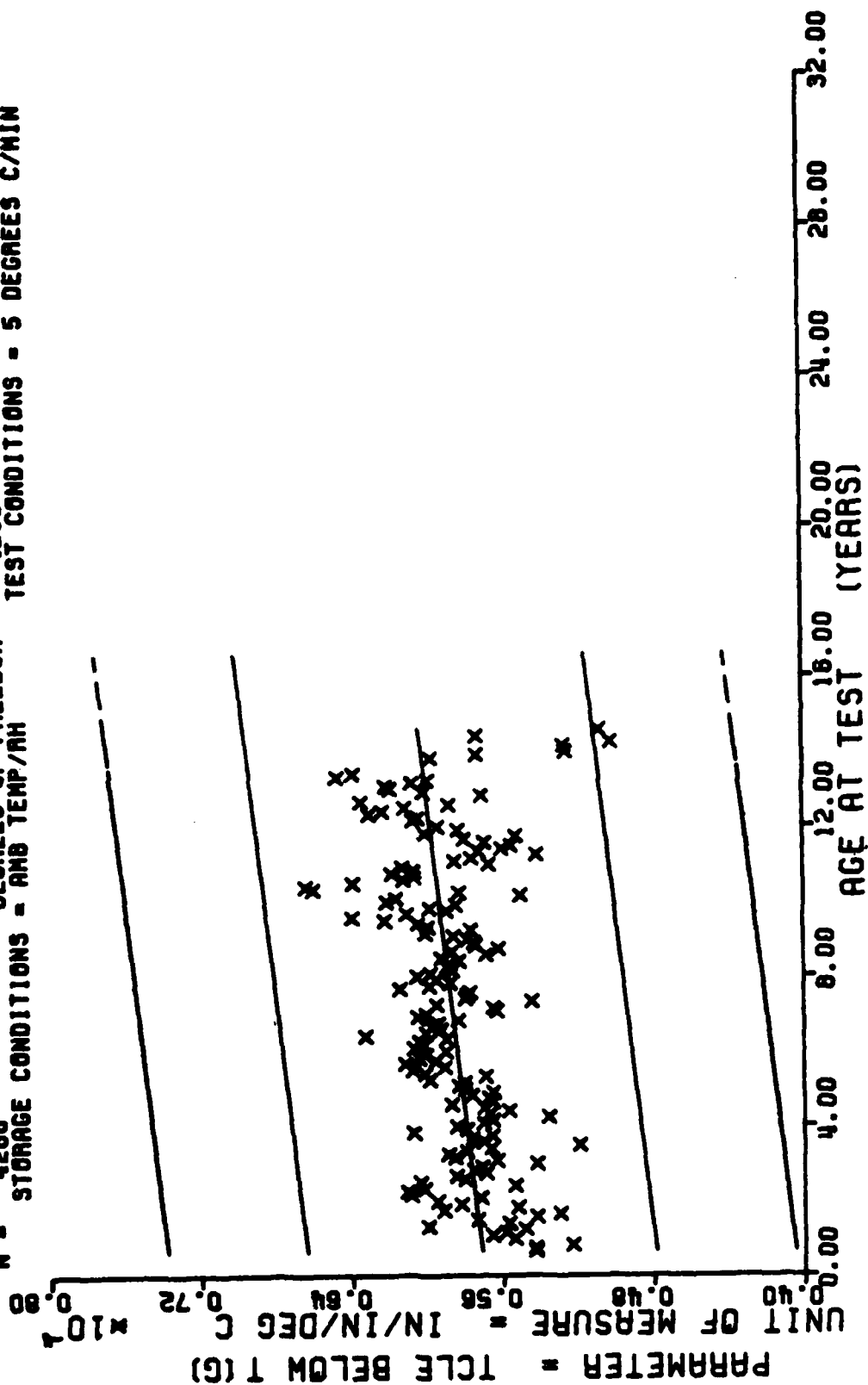
This sample size summary is applicable to figures 63 and 64

STAGE 1, WING 6, TP-H1011, THERMAL COEFFICIENT OF LINEAR EXPANSION ABOVE

This sample size summary is applicable to figures 63 and 64



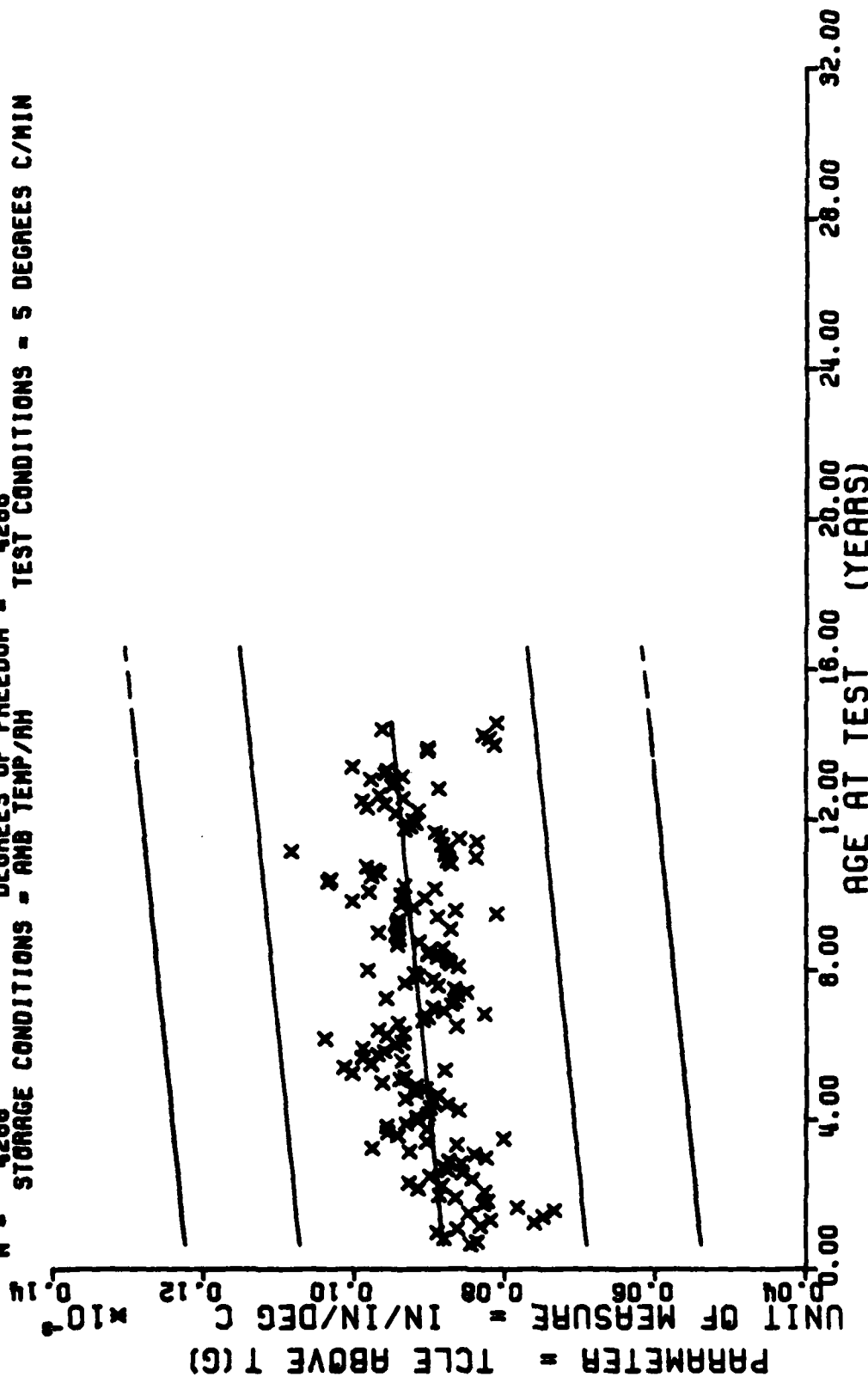
F = +7.1325050E+01  
 R = +1.2023874E-01  
 I = +8.4454637E+00  
 N = 4266  
 Y = (( +5.7015280E-05 ) + ( +1.9149278E-08 ) \* X)  
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF I = SIGNIFICANT  
 DEGREES OF FREEDOM = 4266  
 STORAGE CONDITIONS = AND TEMP/AH  
 TEST CONDITIONS = 5 DEGREES C/MIN  
 S<sub>F</sub> = +5.6016339E-08  
 S<sub>R</sub> = +2.2674037E-09  
 S<sub>I</sub> = +5.5580355E-06



STAGE 1. WING 6. TP-H1011 THERMAL COEFFICIENT OF LINEAR EXPANSION BELOW TG

Figure 63

$F = +7.6910055E+01$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma_r = +1.1527515E-05$   
 $R = +1.3476450E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_e = +4.6619807E-09$   
 $t = +6.6631331E+00$  SIGNIFICANCE OF t = SIGNIFICANT  $S_r = +1.1423696E-05$   
 $N = 4266$  DEGREES OF FREEDOM = 4266  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = 5 DEGREES C/MIN



\*\*\* SAMPLE SIZE SUMMARY \*\*\*

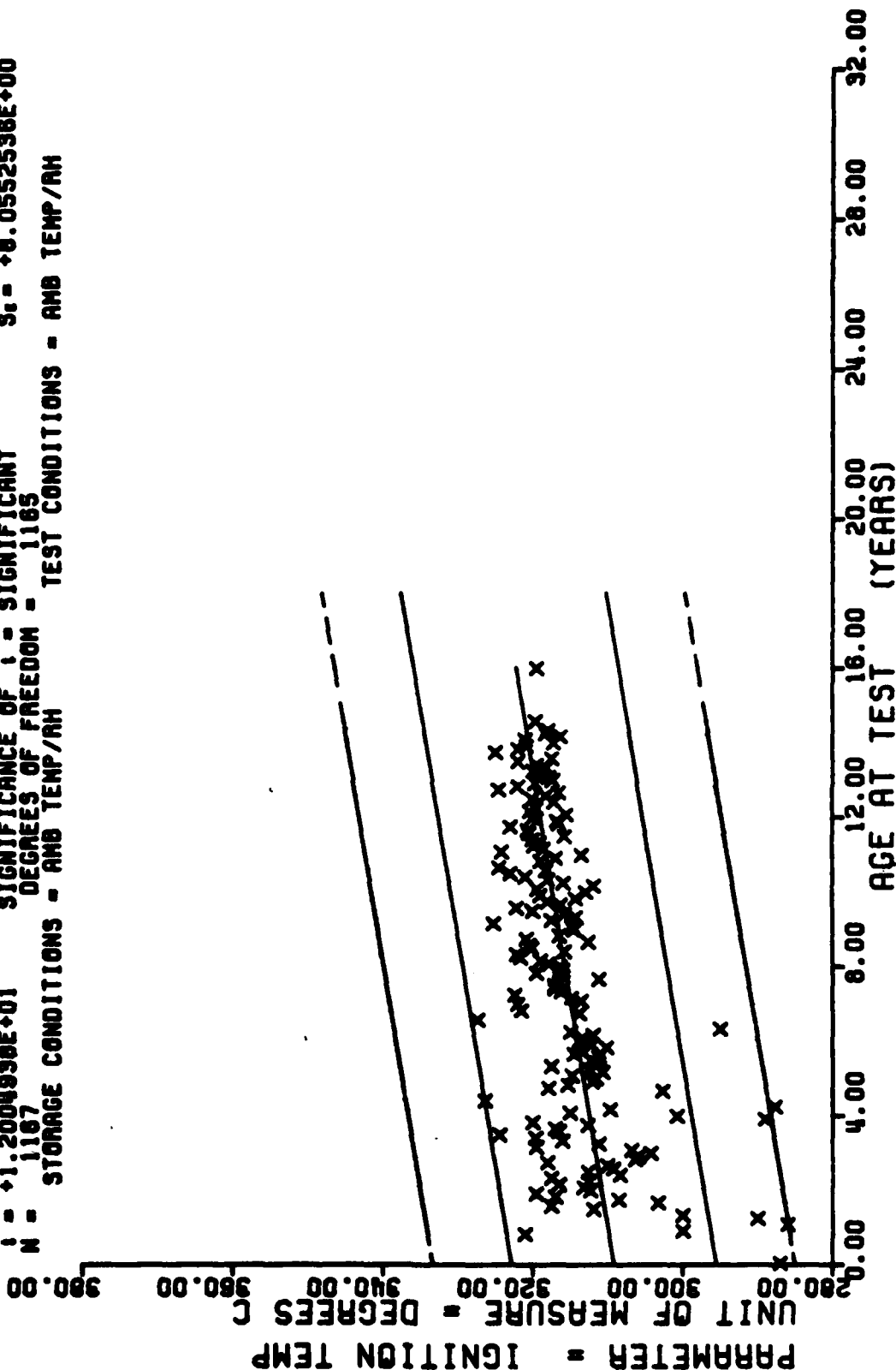
AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	3	37	13	65	14	94	4	121	16	147	8	147	8
10	1	38	4	66	23	95	9	122	16	149	8	149	8
11	1	39	7	67	34	96	20	123	8	150	4	150	4
13	1	40	5	68	20	97	22	124	2	151	10	151	10
15	1	41	17	69	16	98	28	125	2	152	4	152	4
16	1	42	5	70	31	99	25	126	2	153	2	153	2
18	7	43	2	71	10	100	8	127	2	154	4	154	4
19	2	44	2	72	14	101	4	128	2	155	6	155	6
20	4	45	3	73	20	102	5	130	4	156	6	156	6
21	4	46	3	74	14	103	10	131	12	157	6	157	6
22	20	47	1	75	14	104	11	132	8	158	4	158	4
23	4	48	4	76	1	105	6	133	7	159	6	159	6
24	4	49	3	79	6	106	4	134	8	160	4	160	4
25	6	50	3	81	8	108	4	135	4	161	6	161	6
26	14	51	3	82	2	109	2	136	4	162	1	162	1
27	2	53	3	84	2	110	2	137	4	163	2	163	2
28	4	56	3	85	4	111	4	138	2	165	2	165	2
29	14	57	9	86	8	112	2	139	4	166	4	166	4
30	12	58	4	87	3	113	8	140	6	167	4	167	4
31	10	59	13	88	6	114	2	141	2	169	2	169	2
32	2	60	18	89	2	115	6	142	12	171	2	171	2
33	6	61	23	90	4	116	4	143	4	172	2	172	2
34	10	62	21	91	5	117	4	144	4	175	6	175	6
35	9	63	32	92	6	118	4	145	2	192	2	192	2
36	22	64	23	93	2	120	8	146	8				

1 98 1

STAGE I WING C TGA IGNITION TEMPERATURE, 9 DEGREE C RISE/MINUTE

This sample size summary is applicable to figures 65 thru 67

$F = +1.4411859E+02$        $Y = ((+3.0918482E+02) + (+8.8105595E-02) * X)$        $\sigma = +8.5353125E+00$   
 $R = +3.3178545E-01$       SIGNIFICANCE OF F = SIGNIFICANT       $S_1 = +5.6731317E-03$   
 $t = +1.2004938E+01$       SIGNIFICANCE OF t = SIGNIFICANT       $S_2 = +8.0552538E+00$   
 $N = 1167$       DEGREES OF FREEDOM = 1165  
 STORAGE CONDITIONS - AMB TEMP/RH      TEST CONDITIONS - AMB TEMP/RH



STAGE I WING 6      TGA IGNITION TEMPERATURE, 9 DEGREE C RISE/MINUTE

Figure 65

Y = (( +2.2032017E+01 ) + ( +1.7044544E-03 ) \* X )  
 F = +1.6945002E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT  $\sigma_f$  = +4.4520743E+00  
 R = +1.8692005E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT  $S_e$  = +4.3949555E-03  
 t = +4.1104308E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT  $S_e$  = +4.4560139E+00  
 N = 610 DEGREES OF FREEDOM = 608  
 STORAGE CONDITIONS = AMB TEMP/AM TEST CONDITIONS = 12 DEG R/M TOWLD

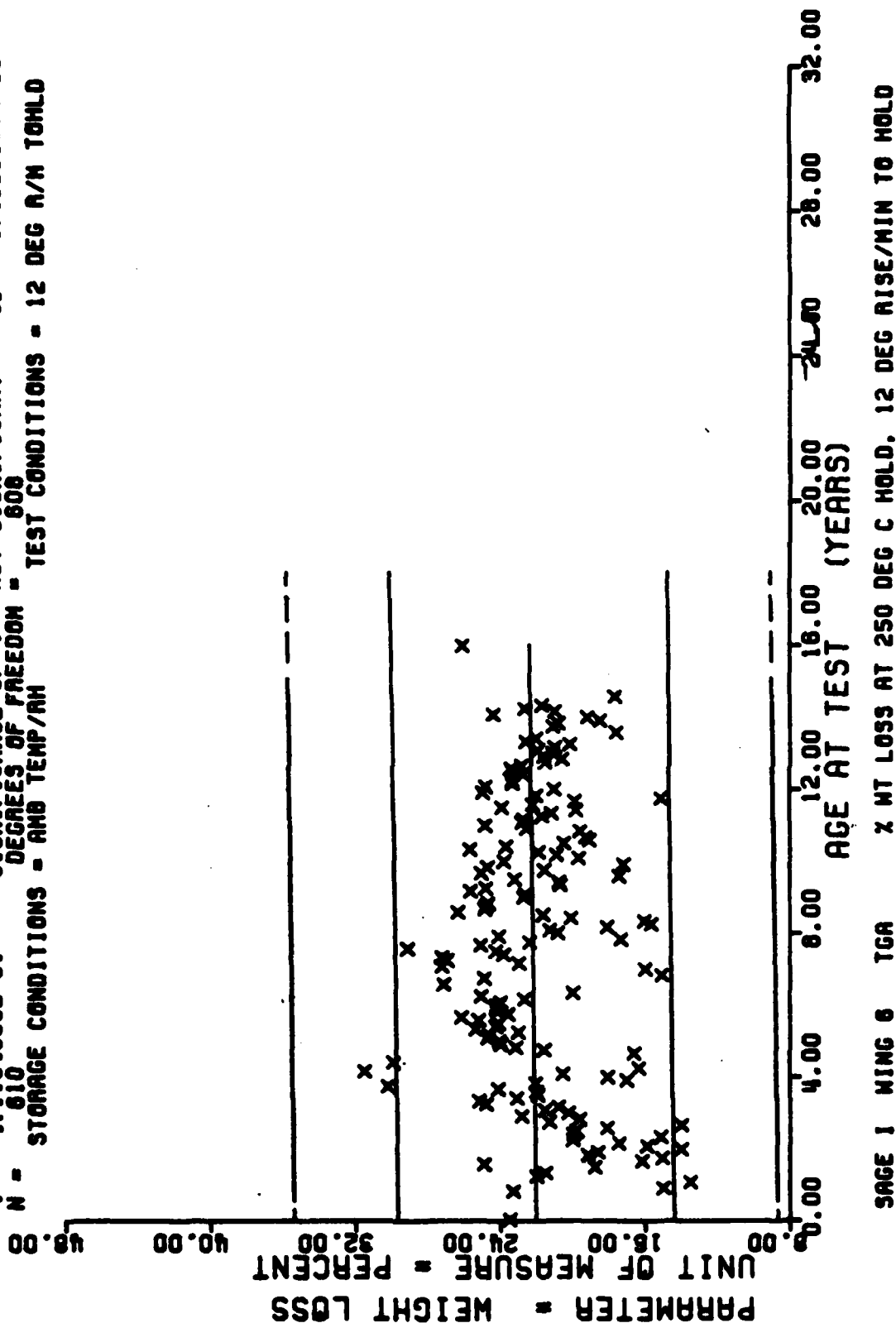


Figure 66

$F = +1.4131020E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $G_1 = +5.4894908E+00$   
 $R = +3.3060204E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_1 = +3.6609203E-03$   
 $t = +1.1887651E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_2 = +5.1829200E+00$   
 $N = 1153$  DEGREES OF FREEDOM = 1151  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = 9 DEG C RISE/MIN

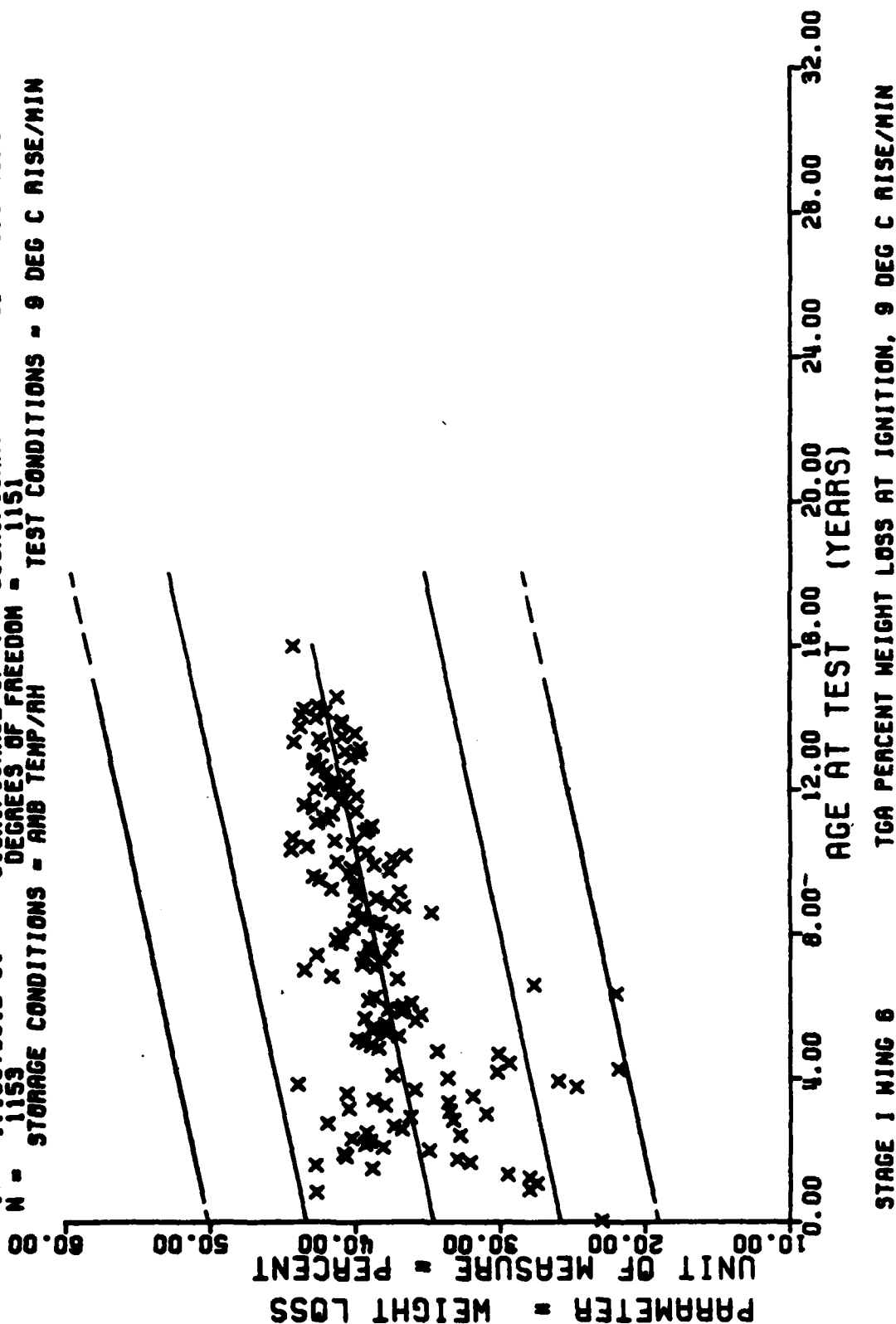


Figure 67

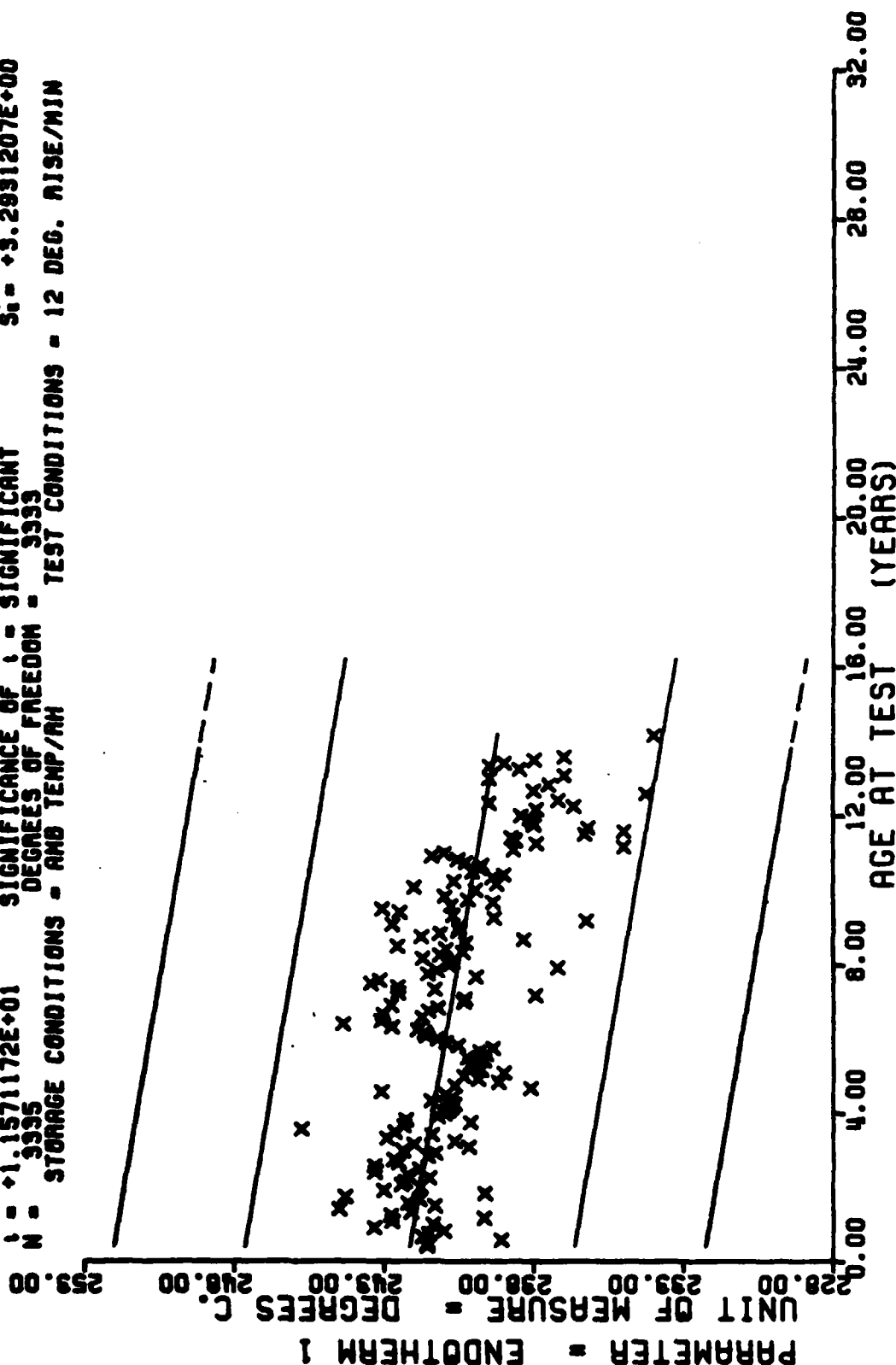
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	VR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
5	9	30	29	15	55	34	80	105	130	62
6	27	31	28	32	56	35	81	106	131	39
7	11	32	23	27	57	30	82	107	132	24
8	14	33	19	41	58	30	83	108	133	16
9	12	34	33	33	59	18	84	109	134	6
10	3	35	24	44	60	20	85	110	135	12
11	3	36	35	41	61	16	86	111	136	8
12	24	37	24	35	62	19	87	112	137	8
13	15	38	9	47	63	20	88	113	138	10
14	18	39	22	25	64	32	89	114	139	6
15	9	40	21	30	65	32	90	115	140	10
16	29	41	5	30	66	13	91	116	141	8
17	14	42	11	59	67	14	92	117	142	20
18	30	43	12	30	68	15	93	118	143	40
19	10	44	6	40	69	21	94	119	144	16
20	11	45	9	70	70	10	95	120	146	12
21	24	46	15	48	71	31	96	121	147	6
22	16	47	47	30	72	41	97	122	148	2
23	13	48	41	32	73	38	98	123	149	16
24	9	49	38	36	74	27	99	124	151	4
25	27	50	27	36	75	22	100	125	152	2
26	20	51	23	18	76	19	101	126	153	2
27	21	52	29	9	77	10	102	127	154	2
28	25	53	34	22	78	20	103	128	155	8
29	20	54	11	26	79	12	104	129	156	4
									157	5
									159	4
									160	2
									161	4
									162	4
									163	2
									170	2

STAGE 1 WING C. TP-H 1011. DTA. ENDOTHERM 1. 12 DEGREE CENTIGRADE RISE/MIN

This sample size summary is applicable to figures 68 and 69

$Y = (1 + 2.4223133E+02) + (-1.7796735E-02) \times X$   
 $F = +1.3389203E+02$  SIGNIFICANCE OF F = SIGNIFICANT  $\sigma = +3.3581107E+00$   
 $R = -1.9852020E-01$  SIGNIFICANCE OF R = SIGNIFICANT  $S_0 = +1.5380234E-03$   
 $t = +1.1571172E+01$  SIGNIFICANCE OF t = SIGNIFICANT  $S_1 = +3.2931207E+00$   
 $N = 3335$  DEGREES OF FREEDOM = 3333  
 STORAGE CONDITIONS = AMB TEMP/AM TEST CONDITIONS = 12 DEG. RISE/MIN

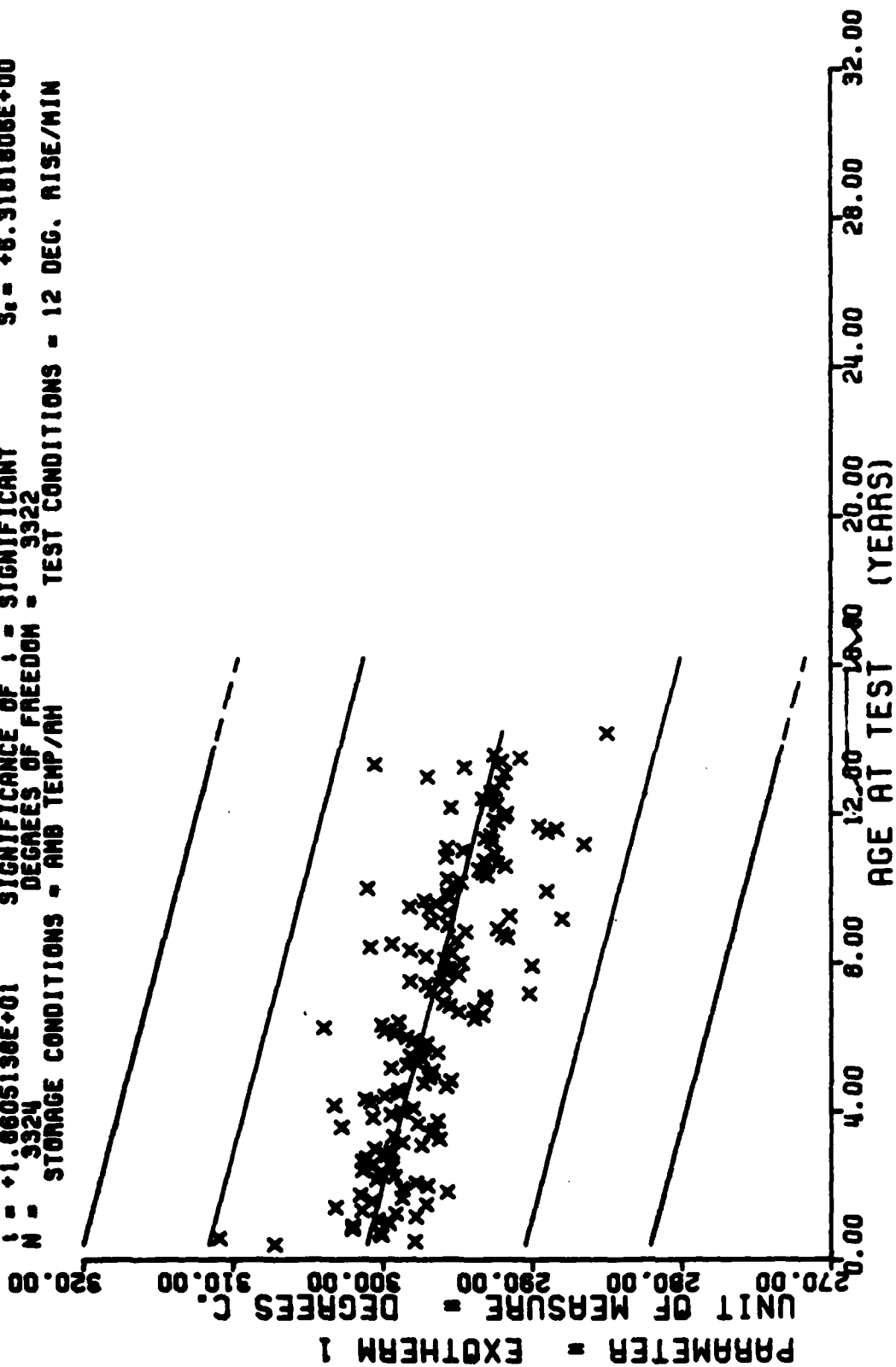


STAGE 1 WING 6, TP-H 1011, DTA, ENDOTHERM 1, 12 DEGREE CENTIGRADE RISE/MIN

Figure 68



$\gamma = ((+3.0131478E+02) + (-5.4927524E-02) \times X)$   
 $F = +3.4615118E+02$  SIGNIFICANCE OF F = SIGNIFICANT  
 $R = -3.0719157E-01$  SIGNIFICANCE OF R = SIGNIFICANT  
 $t = +1.6605138E+01$  SIGNIFICANCE OF t = SIGNIFICANT  
 $N = 3324$  DEGREES OF FREEDOM = 3322  
 STORAGE CONDITIONS = 12 DEG. RISE/MIN  
 TEST CONDITIONS = 12 DEG. RISE/MIN



STAGE 1 WING 6. TP-H 1011. DTA. EXOTHERM 1. 12 DEGREE CENTIGRADE RISE/MIN

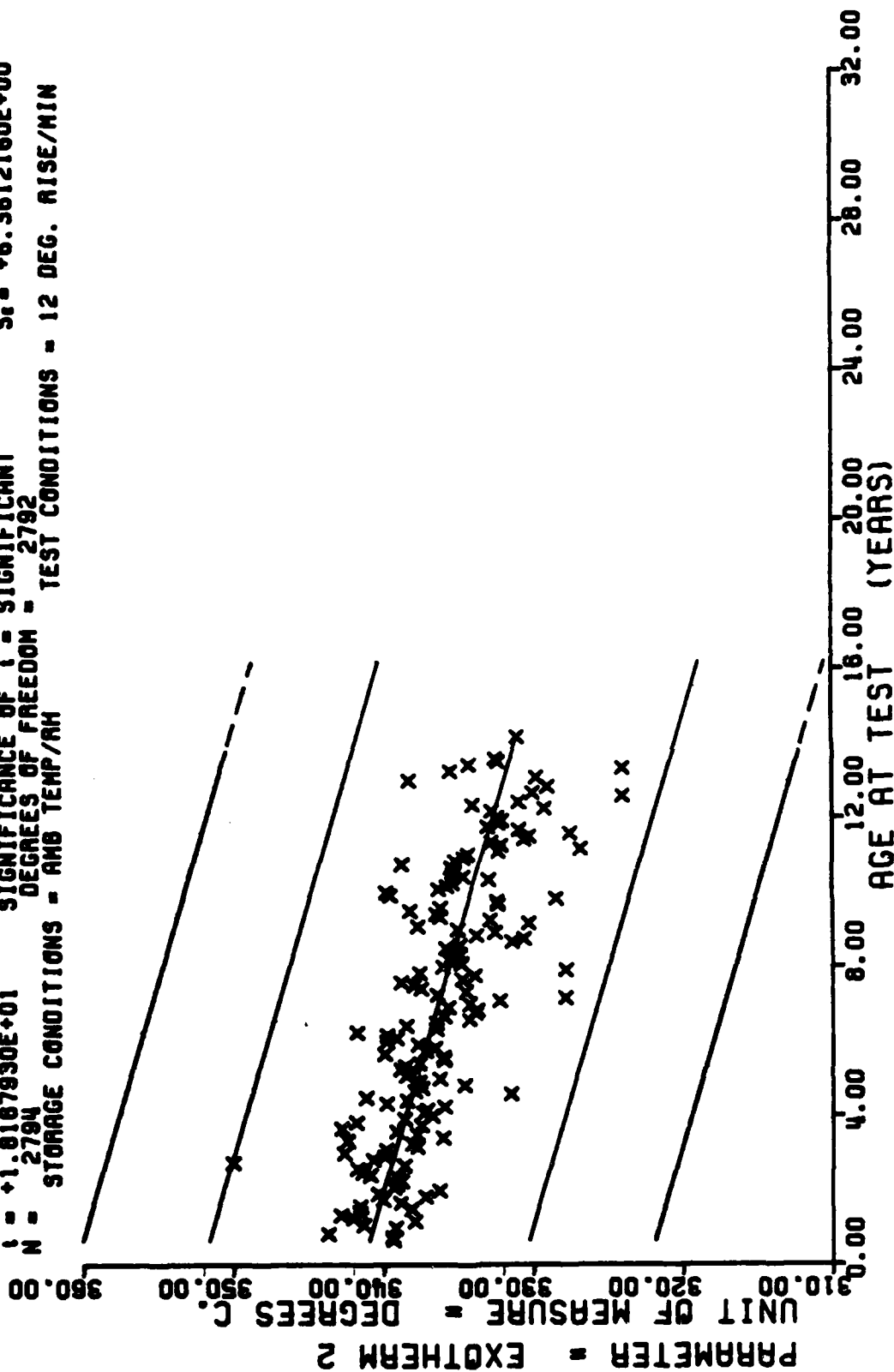
Figure 69

AGE (MOS)	NP SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	3	34	26	59	29	84	16	109	15
9	5	35	21	60	42	85	16	110	4
10	3	36	29	61	34	86	15	111	6
12	17	37	19	62	28	87	17	112	11
13	10	38	7	63	36	88	18	113	35
14	9	39	18	64	16	89	32	114	57
15	5	40	19	65	22	90	31	115	31
16	22	41	5	66	24	91	13	116	9
17	14	42	11	67	48	92	13	117	24
18	18	43	10	68	26	93	14	118	41
19	4	44	4	69	29	94	20	119	2
20	11	45	9	70	56	95	9	120	12
21	22	46	9	71	47	96	28	121	12
22	13	47	42	72	23	97	33	122	13
23	10	48	31	73	26	98	36	123	3
24	9	49	30	74	31	99	25	124	9
25	20	50	17	75	27	100	18	125	17
26	16	51	14	76	16	101	17	126	16
27	12	52	18	77	9	102	10	127	5
28	19	53	25	78	21	103	18	128	19
29	18	54	9	79	26	104	11	129	10
30	22	55	15	80	34	105	7	130	50
31	21	56	30	81	33	106	15	131	37
32	22	57	25	82	30	107	4	132	22
33	11	58	27	83	26	108	12	133	14

STAGE 1 WING 6, TP-H 1011, DTA, EXOTHERM 2, 12 DEGREE CENTIGRADE RISE/MIN

**This sample size summary is applicable to figures 70 and 71**

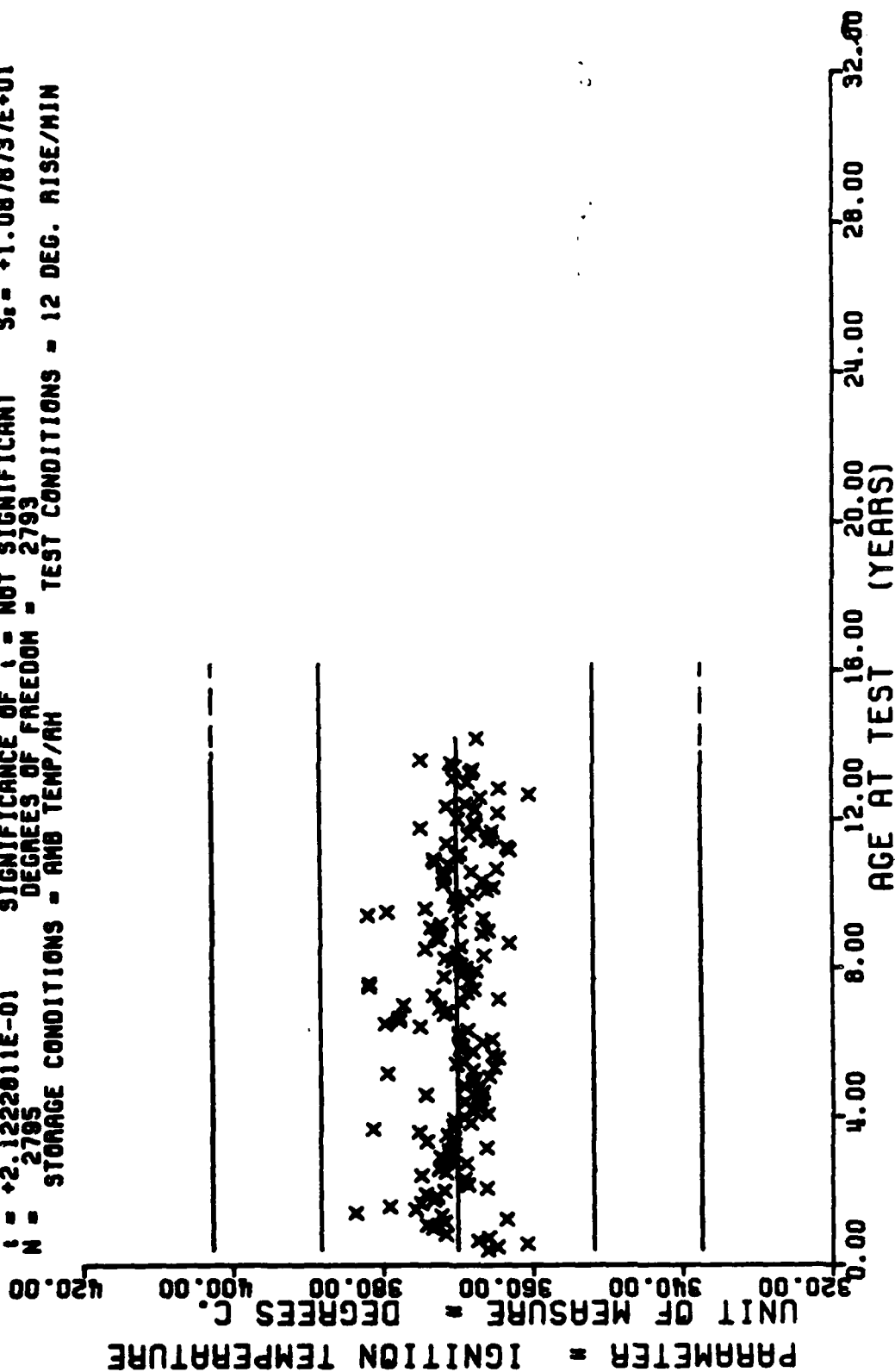
$F = +3.3007370E+02$     SIGNIFICANCE OF F =  $-6.1129372E-02$      $\chi^2$  =  $+6.7255259E+00$   
 $R = -3.2515009E-01$     SIGNIFICANCE OF R = SIGNIFICANT     $S_e$  =  $+3.3646854E-03$   
 $t = +1.8187930E+01$     SIGNIFICANCE OF t = SIGNIFICANT     $S_e$  =  $+6.3612160E+00$   
 $N = 2794$     DEGREES OF FREEDOM = 2792    TEST CONDITIONS = 12 DEG. RISE/MIN  
 STORAGE CONDITIONS = AMB TEMP/AM



STAGE 1 WING 6, TP-H 1011, DTA, EXOTHERM 2, 12 DEGREE CENTIGRADE RISE/MIN

Figure 70

$Y = (( +3.7007483E+02 ) + ( +1.1810183E-03 ) * X)$   
 $F = +4.5040774E-02$  SIGNIFICANCE OF F = NOT SIGNIFICANT  $\sigma^2 = +1.0876877E+01$   
 $R = +4.0157249E-03$  SIGNIFICANCE OF R = NOT SIGNIFICANT  $S_e = +5.4706059E-03$   
 $t = +2.1222011E-01$  SIGNIFICANCE OF t = NOT SIGNIFICANT  $S_e = +1.08768737E+01$   
 $N = 2795$  DEGREES OF FREEDOM = 2793  
 STORAGE CONDITIONS = AMB TEMP/AH TEST CONDITIONS = 12 DEG. RISE/MIN



STAGE 1 HING 8, TP-H 1011, DTA, IGNITION TEMPERATURE, 12 DEGREE CENT. RISE/MIN

Figure 71

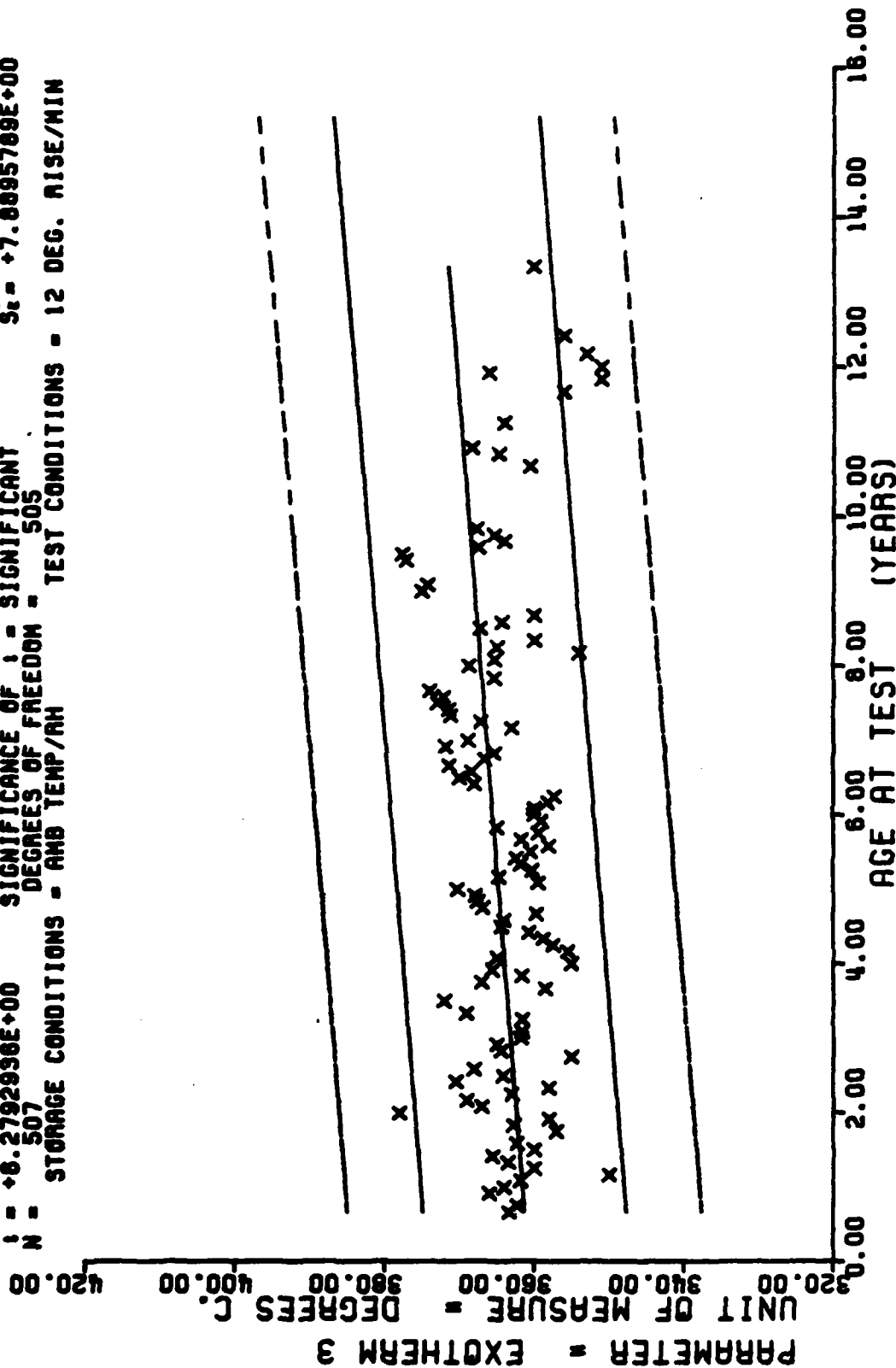
\*\*\* SAMPLE SIZE SUMMARY \*\*\*

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	3	36	4	64	4	91	6
9	7	37	5	65	7	92	2
11	3	39	2	66	4	94	3
12	4	40	5	67	11	96	6
13	5	42	3	68	8	97	4
14	3	44	2	69	7	98	1
15	1	45	1	70	4	99	1
16	4	46	5	71	2	100	1
17	5	47	7	72	6	102	4
18	5	48	8	73	4	103	3
19	6	49	2	74	6	104	1
21	2	50	2	75	9	108	3
22	4	51	2	77	3	109	4
23	1	52	4	78	3	110	1
24	1	53	6	79	18	113	11
25	1	54	3	80	12	114	21
26	2	55	5	81	10	115	7
27	4	56	3	82	8	116	2
28	3	57	7	83	8	117	3
29	5	58	5	84	7	118	3
30	9	59	7	86	1	128	2
31	4	60	4	87	8	130	9
33	4	61	7	88	8	131	4
34	5	62	6	89	16	135	3
35	4	63	5	90	12	140	1

STAGE 1 WING 6, TP-H 1011. DIA. EXOTHERM 3, 12 DEGREE CENTIGRADE RISE/MIN

This sample size summary is applicable to figure 72

$F = +3.8429528E+01$   
 $R = +2.6911628E-01$   
 $I = +6.2792938E+00$   
 $N = 507$   
 $Y = ((+3.6075008E+02) + (+8.8615407E-02) * X)$   
 SIGNIFICANCE OF F = SIGNIFICANT  
 SIGNIFICANCE OF R = SIGNIFICANT  
 SIGNIFICANCE OF I = SIGNIFICANT  
 DEGREES OF FREEDOM = 505  
 STORAGE CONDITIONS = AND TEMP/RH  
 TEST CONDITIONS = 12 DEG. RISE/MIN



STAGE 1 WING 6, TP-H 1011, DTA, EXOTHERM 3, 12 DEGREE CENTIGRADE RISE/MIN

Figure 72

[illegible]

STAGE 1 #P16 & TP-H1011 RUNNING RATE AT 1000 PSI

**This sample size summary is applicable to figure 73**

$Y = ((+2.9446518E-01) + (+2.5891355E-05) \times X)$   
 $F = +1.6881221E+01$  SIGNIFICANCE OF F = SIGNIFICANT  $G = +1.4816735E-02$   
 $R = +6.6793344E-02$  SIGNIFICANCE OF R = SIGNIFICANT  $S_1 = +6.3016293E-06$   
 $I = +4.1086763E+00$  SIGNIFICANCE OF I = SIGNIFICANT  $S_2 = +1.4785609E-02$   
 $N = 3769$  DEGREES OF FREEDOM = 3767  
 STORAGE CONDITIONS = AMB TEMP/AM TEST CONDITIONS = 1000 PSI

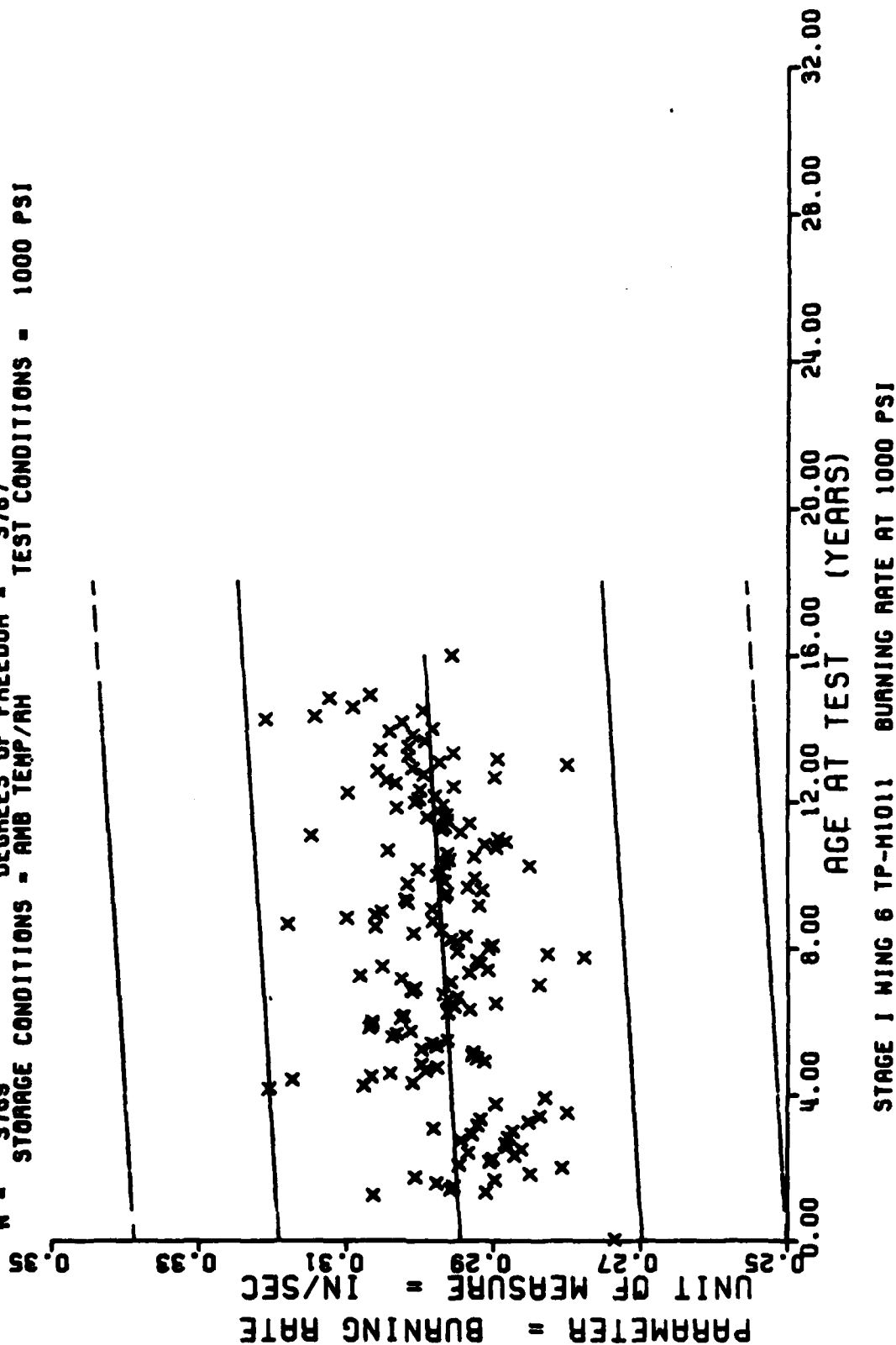


Figure 73



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4. TITLE (and Subtitle) Propellant Surveillance Report LGM-30 F & G Stage I, Phase G, Series 1 TP-H1011		5. TYPE OF REPORT & PERIOD COVERED
7. AUTHOR(s) JOHN A. THOMPSON		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Propellant Analysis Laboratory Directorate of Maintenance OOALC Hill AFB, UT 84056		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Service Engineering Division Directorate of Materiel Management OOALC Hill AFB, UT 84056		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS MMWRBA Project M04046C
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE February 1982
		13. NUMBER OF PAGES 130
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)  Approved for Public Release, Distribution Unlimited		
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30F and G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk carton propellant data. Testing was accomplished in accordance with MMWRBA Project M04046C.  The data from this test period are combined with data from previous testing and entered into the G085 Computer for storage, analysis, and regression analysis. From the statistical analysis of all data tested to date (fifteen and one-half		

years for F and G), significant degradation of the propellant does not appear likely for at least two years past the oldest data point.

Each point on the regression plot represents the mean of all samples at that particular age. The number of samples at each point is indicated on the sample size summary sheet on the page accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the G085 System.

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